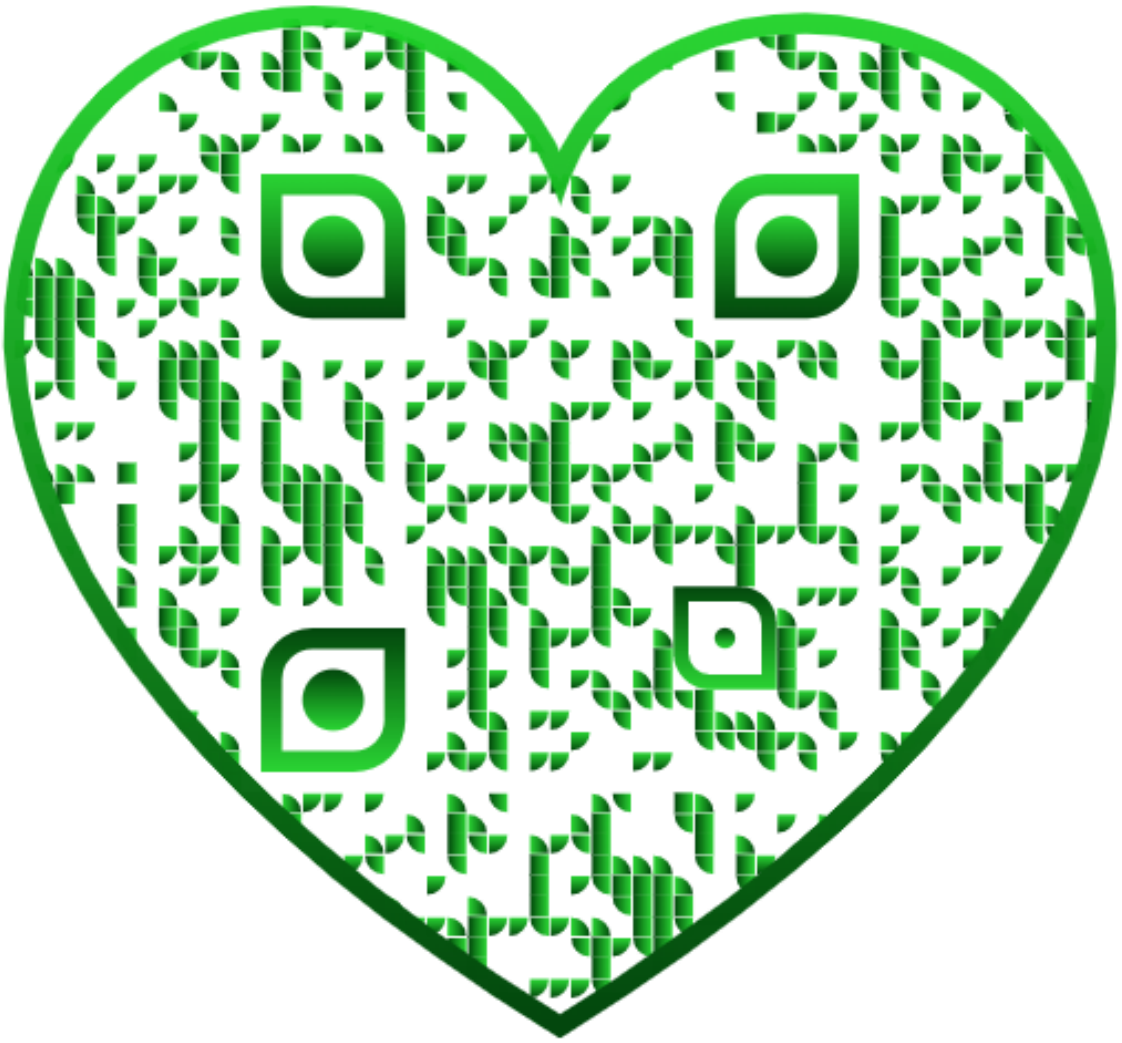
Introduction

Done by/Dr.Sumaia Al-Gumaei



Parasitology:

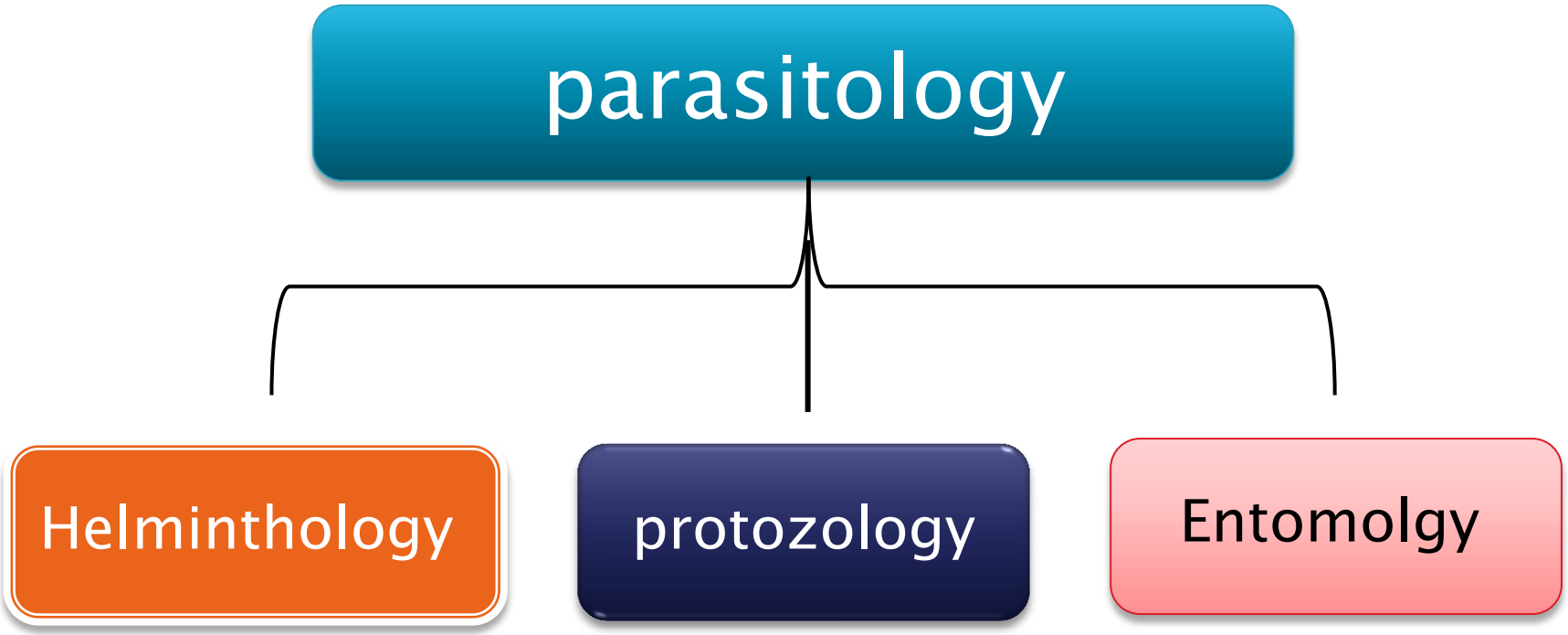
is the science that deal with parasites and whole phenomenon of parasitemia.

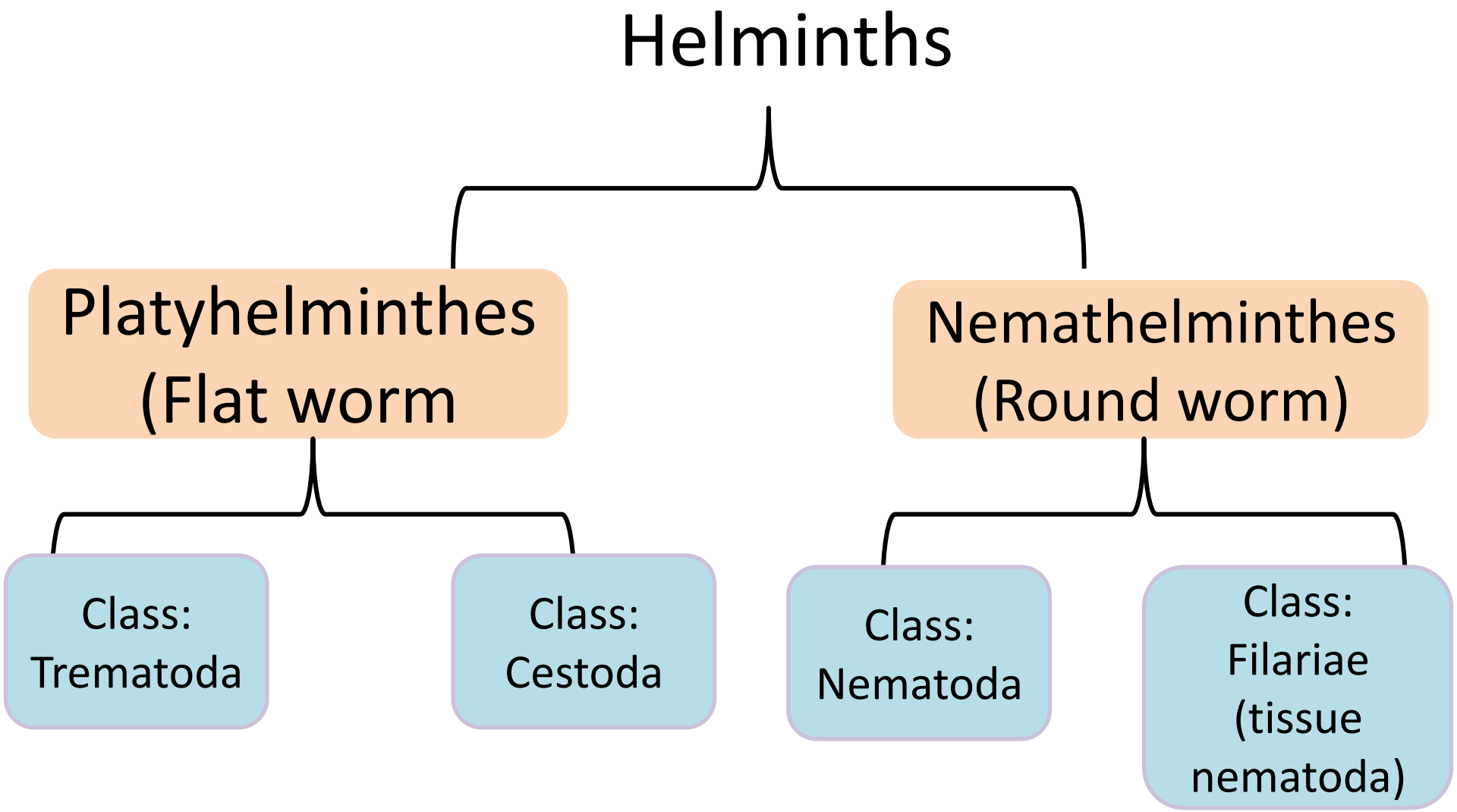
Prarasite:

is an organism that lives at the expense of another called host ,causing a certain of harm or injury to its host .

Type of host:

- Intermediate host: is the host that harbors the immature or asexual stages of parasites.
- Definitive host: is the host that harbors the mature or sexual stages of parasites.
- Reservoir host: It is animal that serves as a source of parasite


parasitology
Helminthology
protozolgy
Entomolgy


Helminths
Platyhelminthes (Flat worm
Nemathelminthes (Round worm)
Class: Trematoda
Class: Cestoda
Class: Nematoda
Class: Filariae (tissue nematoda)

Class: Trematoda (Flukes)

General characters:

- Flat, un-segmented, and leaf-like worms.
- It has no body cavity and covered with cuticle.
- Worm is attached to the host by suckers.
- Hermaphrodite except *Schistosoma*.

Trematoda classified according to the habitat into:

- **Liver flukes:**
  - *Fasciola hepatica*
  - *Fasciola gigantica*
  - *Clonorchis sinensis*
- **Lung fluke:**
  - *Paragonimus westermani*
- **Intestinal flukes:**
  - *Heterophyes heterophyes*
- **Blood flukes:**
  - *Schistosoma mansoni*
  - *Schistosoma haematobium*
  - *Schistosoma japonicum*

Liver flukes

Kingdom: Animal
Subkingdom: Metazoa
Phylum: Platyhelminthes
Class: Trematoda
Genus: Fasciola

- *Fasciola hepatica*
- *Fasciola gigantica*

Fasciola species

- ✓ ***Fasciola hepatica*:** is common in sheep
- ✓ ***Fasiola gigantica*:** is common in cattle

- ❑ **Disease:** Fascioliasis ,liver rot
- ❑ **Habitat:** bile duct of man(D.H)&herbivorous animals (reservoir host)
- ❑ **Intermediate host:** Snail (Lymnaea cailliaudi in F.gigantica &Lymnaea truncatula in F.hepatica)
- ❑ **Infective stage :** Encysted metacercaria.
- ❑ **Diagnostic stage:** Egg
- ❑ **Mode of infection:** through ingestion of encysted metacercaria on vegetables or water.

Morphology:

A- adult:

	Fasciola gigantica	*Fasciola hepatica*
Size	6x1.5 cm	3x1 cm
Anterior cone	small	large
Laterial margine	parallel	converging
Sukers	Oral smaller than ventral	equal
Shoulder	Less prominent	More prominent

2- Liver Fluke

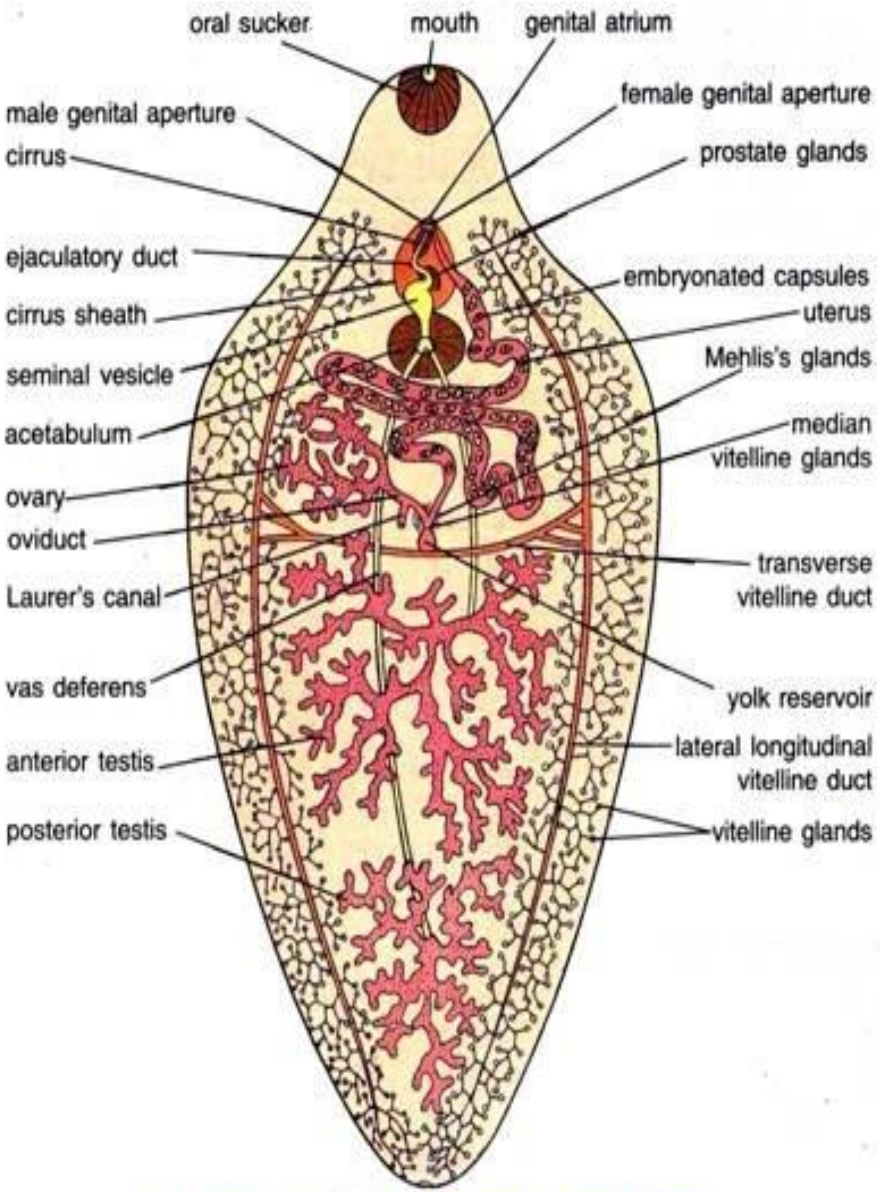
Fasciola

Fasciola hepatica

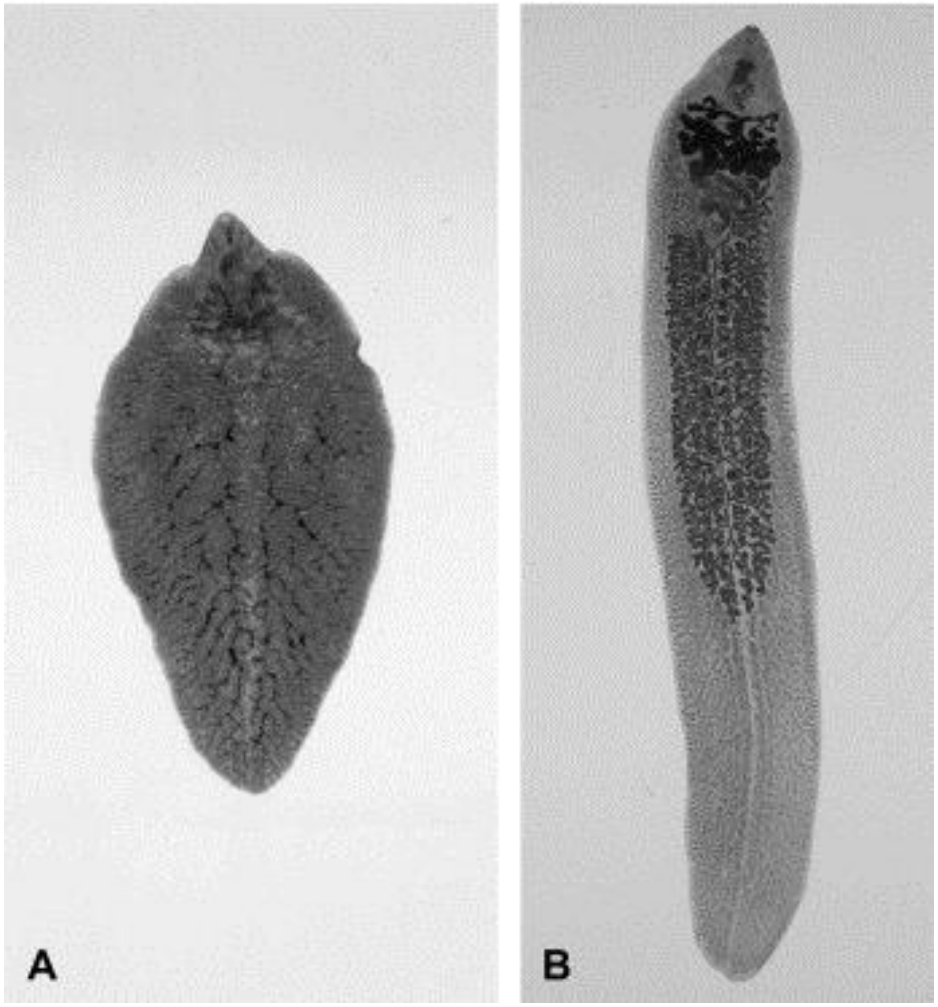
2 prominent shoulders, converging margins, smaller in size (magnifier)

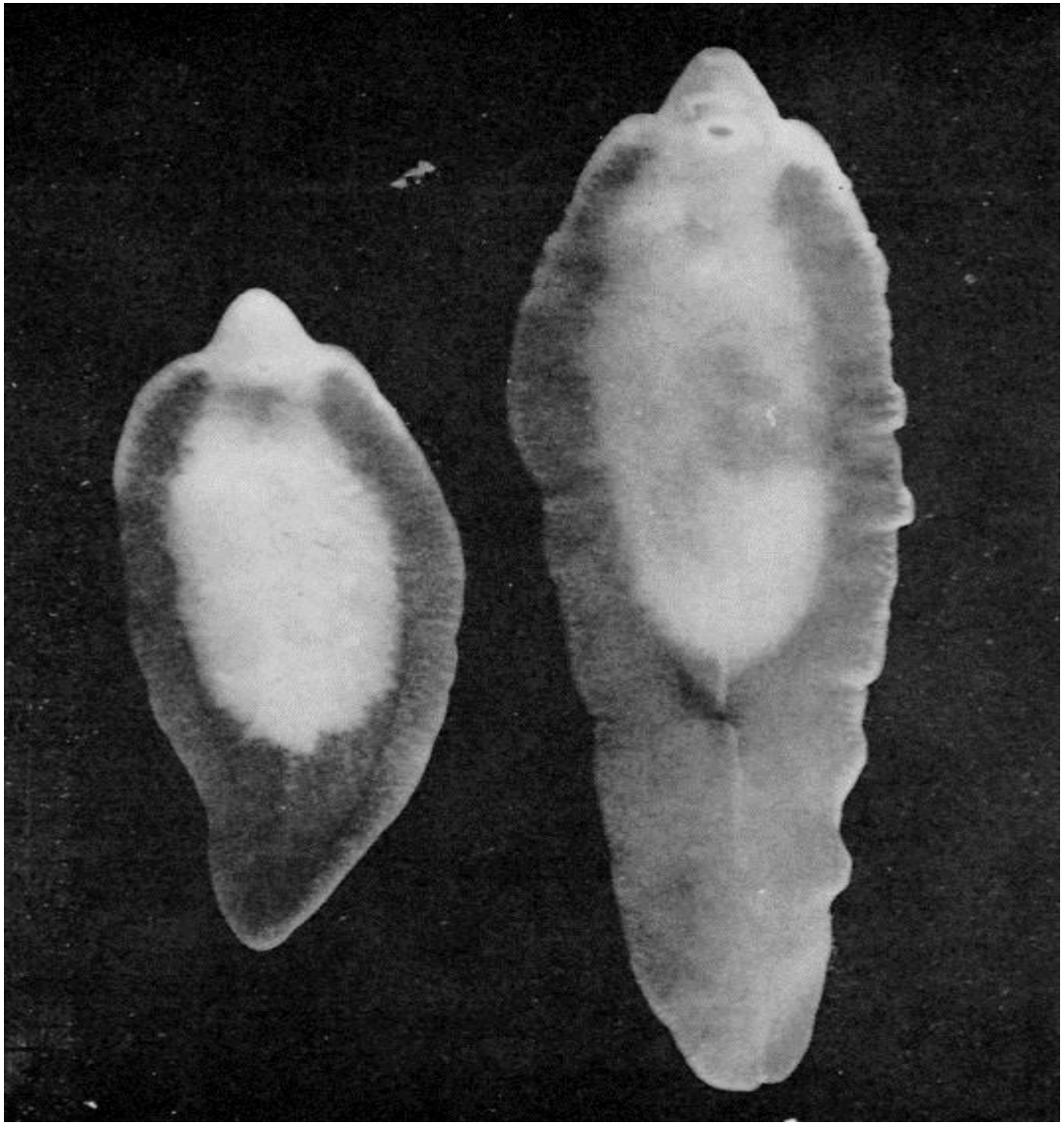
Fasciola gigantica

Less prominent shoulders, parallel margins, larger in size (magnifier)



41.8. *Fasciola hepatica*. Reproductive system.

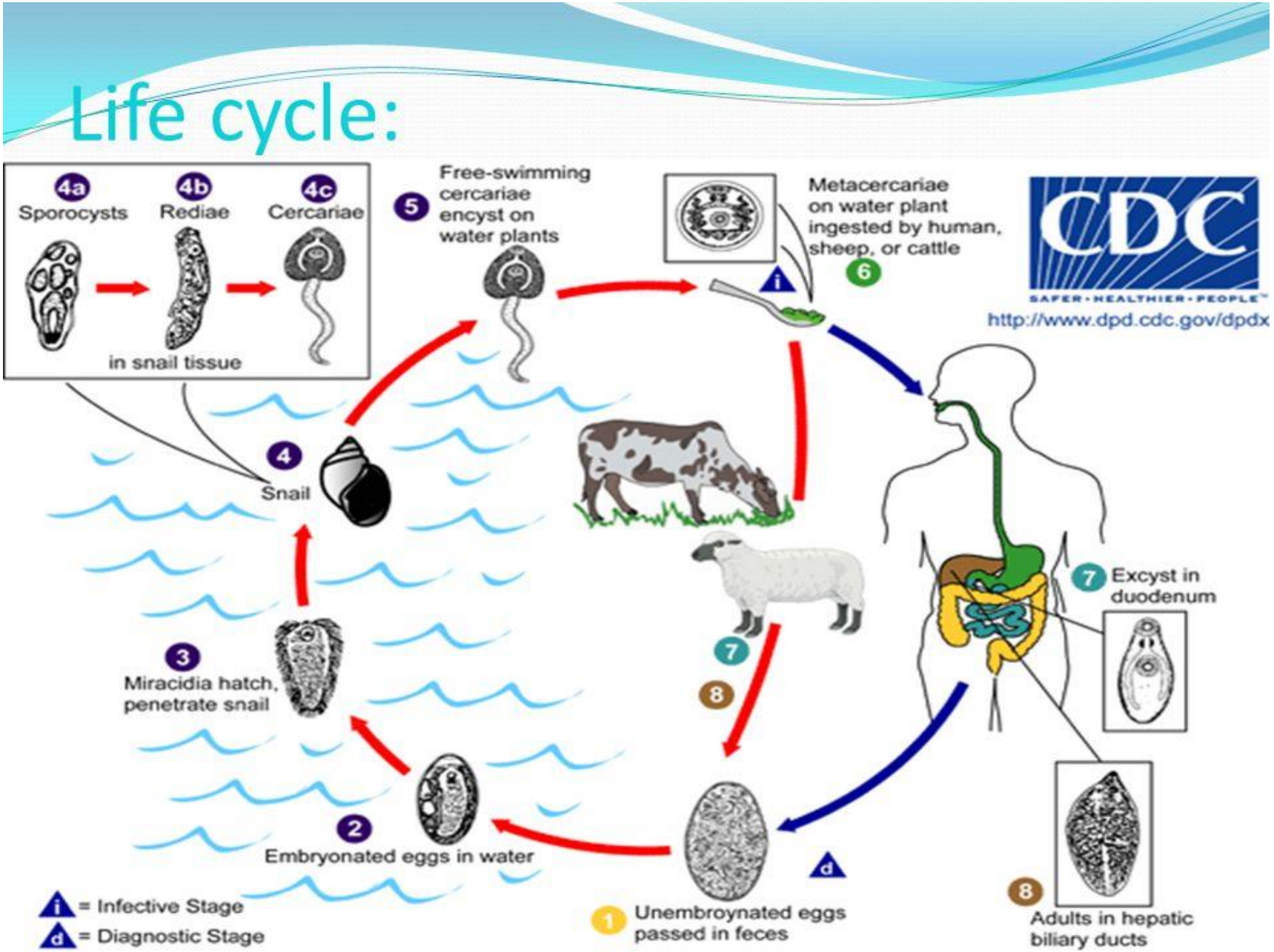

A
B



B- Egg:

- Size:140x70 Mm
- Oval, operculated and thin shelled
- Content: immature ovum
- color: yellowish brown

Life cycle:


Life cycle:
4a Sporocysts
4b Rediae
4c Cercariae
in snail tissue
5 Free-swimming cercariae encyst on water plants
Metacercariae on water plant ingested by human, sheep, or cattle
6
i
CDC
SAFER·HEALTHIER·PEOPLE
http://www.dpd.cdc.gov/dpdx
4 Snail
3 Miracidia hatch, penetrate snail
7 Excyst in duodenum
7
8
2 Embryonated eggs in water
d
1 Unembroynated eggs passed in feces
8 Adults in hepatic biliary ducts
i = Infective Stage
d = Diagnostic Stage

Schistosoma

Schistosoma

Kingdom: Animal
Phylum: Platyhelminthes
Class: Trematoda
Genus: *Schistosoma*
Species:

1-Schistosoma mansoni
2-Schistosoma haematobium
3-Schistosoma japonicum

Schistosoma

❖General characters for Schistosoma:

1-Adult have separate sexes.
2-Adult female is cylindrical .
3-Intestinal caeca is reunite .
4-Ova have spine .
5-No Redia stage .

❖Habitat of Schistosoma species:

- ***Schistosoma mansoni:*** mesenteric venous plexus.
- ***Schistosoma haematobium:*** pelvic &vesicle plexus.
- ***Schistosoma japonicum:*** mesenteric venous plexus.

❖ Disease:

- *Schistosoma mansoni :* Intestinal schistosomiasis.
- *Schistosoma haematobium:* Urinary schistosomiasis.
- *Schistosoma japonicum:* Intestinal schistosomiasis.

❖ **D.H:** Human

❖ **I.H:** Snail

- Bulinus truncatus (for *S.haematobium*)
- Biomphalaria alexandrina (for *S.mansoni*)
- Onchomelania (for *S.japonicum*)

Onchomelania

Biomphalaria alexandrina

Bulinus truncatus

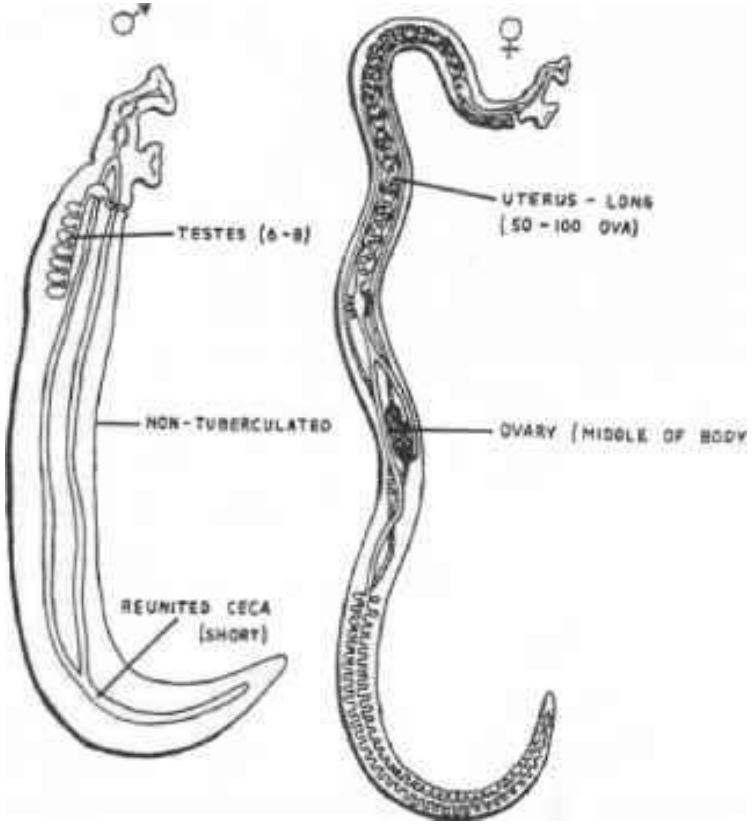
- **Infective stage:** Furcocercus cercaria
- **Diagnostic stage:** Egg in stool (*S.mansoni,S.japonicum*) & Egg in urine (*S.haematobium*)
- **Mode of infection:** by penetration furcocercus cercaia human skin.

Morphology:

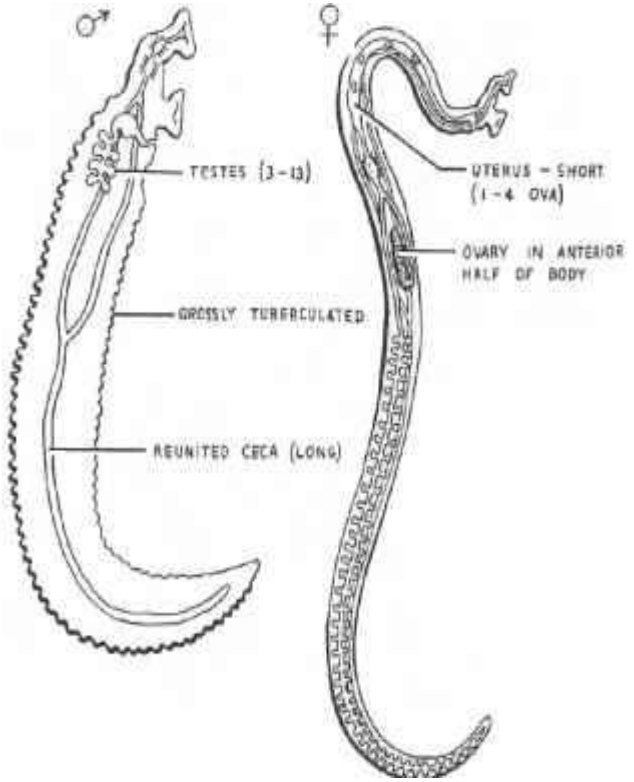
A-adult:

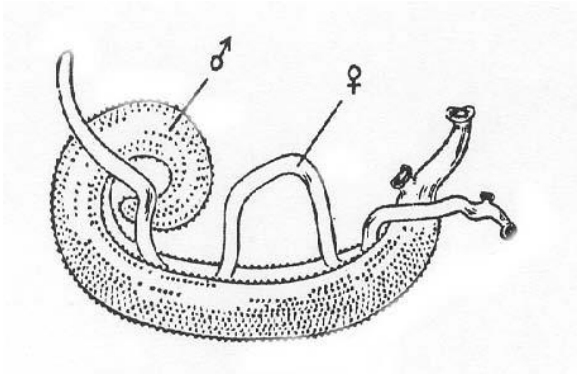
	S.haematobium	*S.mansoni*
Size	Male:10x1mm female:20x0.15	Male:8x1mm Female:15x0.15mm
Cuticle	Finely tuberculated	Coarsely tuberculated
Testes	3-5 arranged in a single row	6-9 small in size are overlapping
Union of intestinal caeca	In posterior half	In anterior half
Ovary	In posterior half	In anterior half
Uterus	Long, contain 20-30 eggs	Short, contain 2-4 eggs

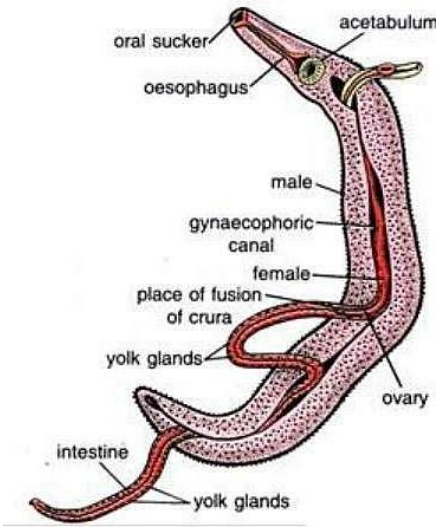
Schistosoma haematobium



Schistosoma mansoni

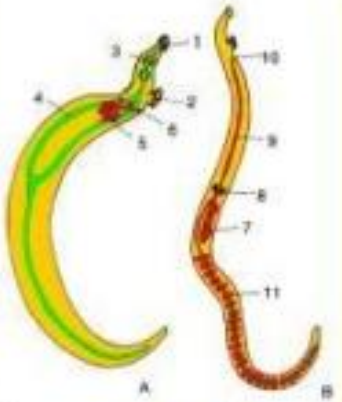




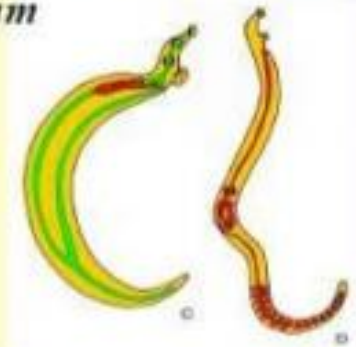


Male and Female Schistosomes

S.mansoni



S. japonicum



S. haematobium

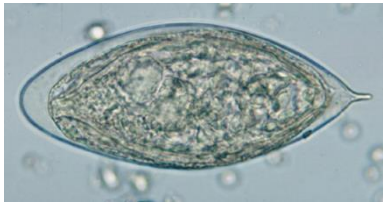
B- Egg:

➢ Egg of *Schistosoma mansoni*:

- Size : 150 x 60 Mm
- Oval
- With lateral spine
- Content: Miracidium
- Color: Translucent

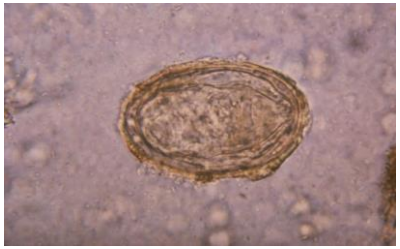
➢ Egg of *Schistosoma haematobium* :

- 140 x 60 Mm
- Oval
- With terminal spine
- Content: Miracidium
- Color: Translucent



➢ Egg of *Schistosoma japonicum*:

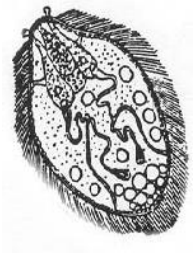
- Size :80 x 60 Mm
- almost round
- With small lateral spine, often not visible
- Content: Miracidium
- Color: Translucent



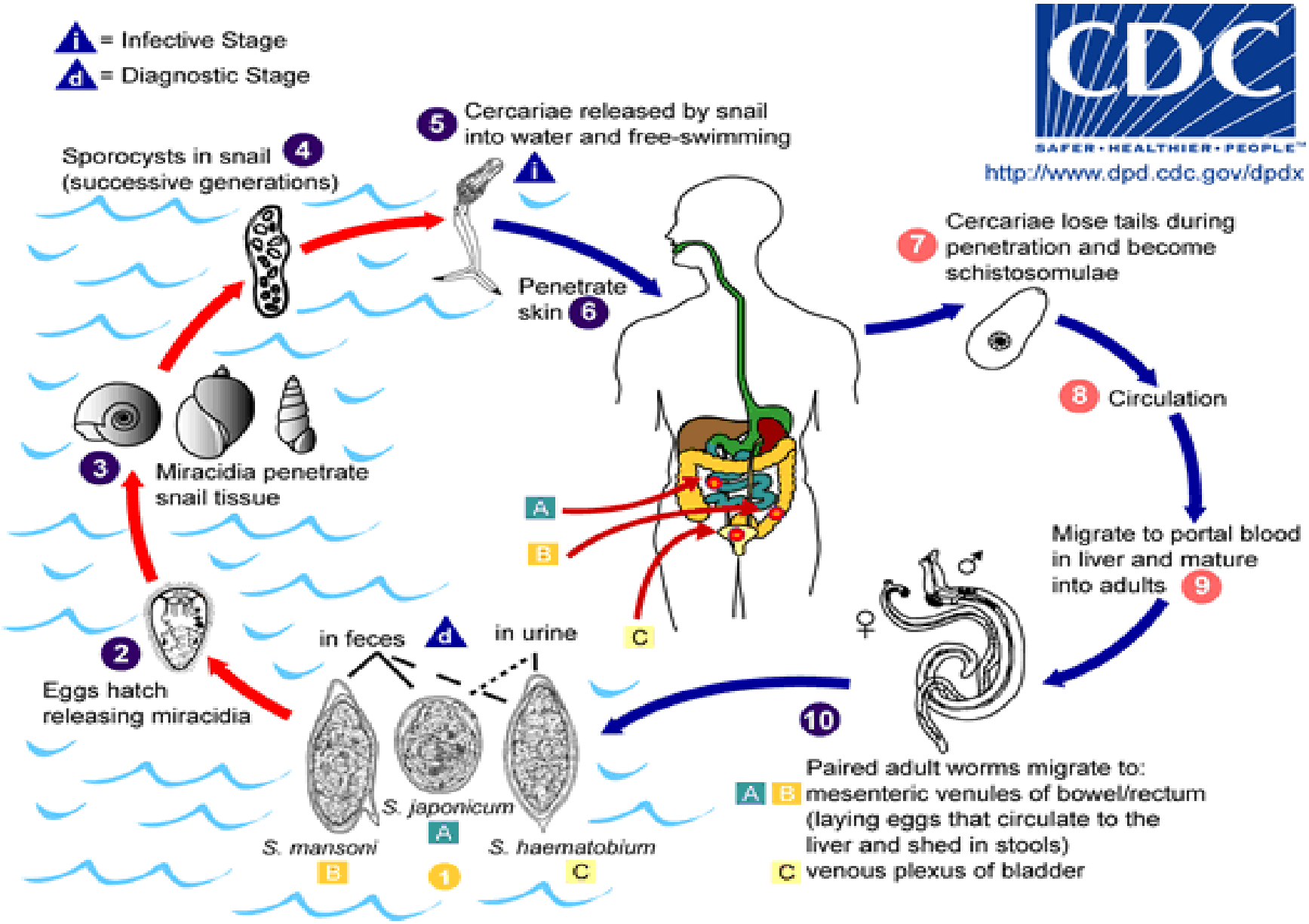
C- Furcocercus cercaria :

- with forked tail

D-Miracidium:



Life cycle:


i = Infective Stage
d = Diagnostic Stage
CDC
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http://www.dpd.cdc.gov/dpdx
5 Cercariae released by snail into water and free-swimming
Sporocysts in snail 4 (successive generations)
Penetrate skin 6
7 Cercariae lose tails during penetration and become schistosomulae
8 Circulation
Migrate to portal blood in liver and mature into adults 9
3 Miracidia penetrate snail tissue
A
B
C
in feces
d
in urine
2 Eggs hatch releasing miracidia
10
Paired adult worms migrate to:
A B mesenteric venules of bowel/rectum (laying eggs that circulate to the liver and shed in stools)
C venous plexus of bladder
S. japonicum
A
S. mansoni
B
S. haematobium
C
1

Clonorchis sinensis

Chinese liver fluke

Kingdom: Animal
Phylum: Platyhelimnthes
Class: Trematoda
Genus : Clonorchis
Species: *Clonorchis sinensis*

Clonorchis sinensis

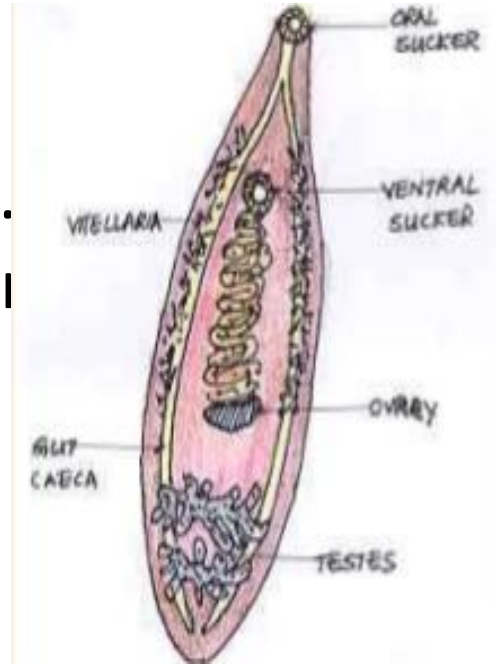
Chinese liver fluke

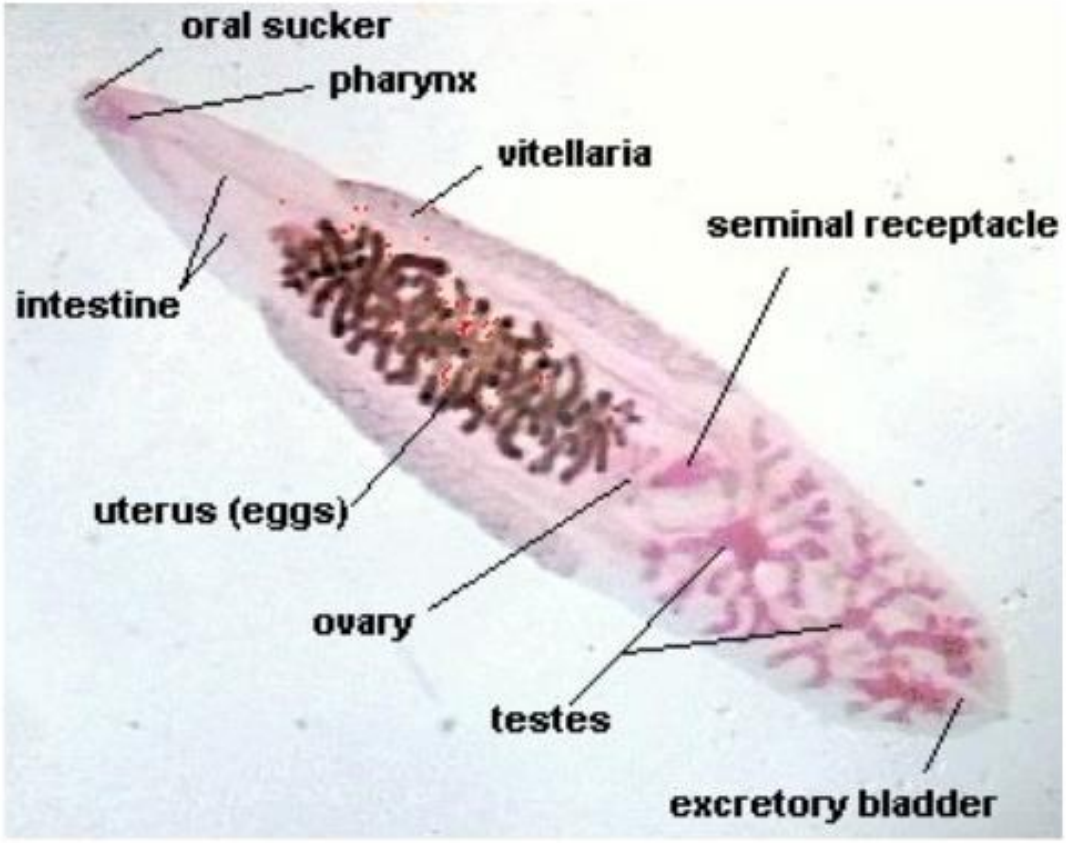
- **Habitat**: Liver and biliary tract of man and fish eating animals(dogs & cats).
- **I.H:** first I.H is Snail – second I.H is fish.
- **D.H :** Man &fish eating animal.
- **Infective stage:** Encysted metacercaria.
- **Diagnostic stage :**Egg.
- **Mode of infection:** By ingestion uncooked fish containing encysted metacercaria.

Morphology:

A- adult:

- It is moderate in size from 1 to 2.5 cm.
- Ventral sucker smaller than oral sucker
- Vitelline glands fill the lateral mid-portion of the body.

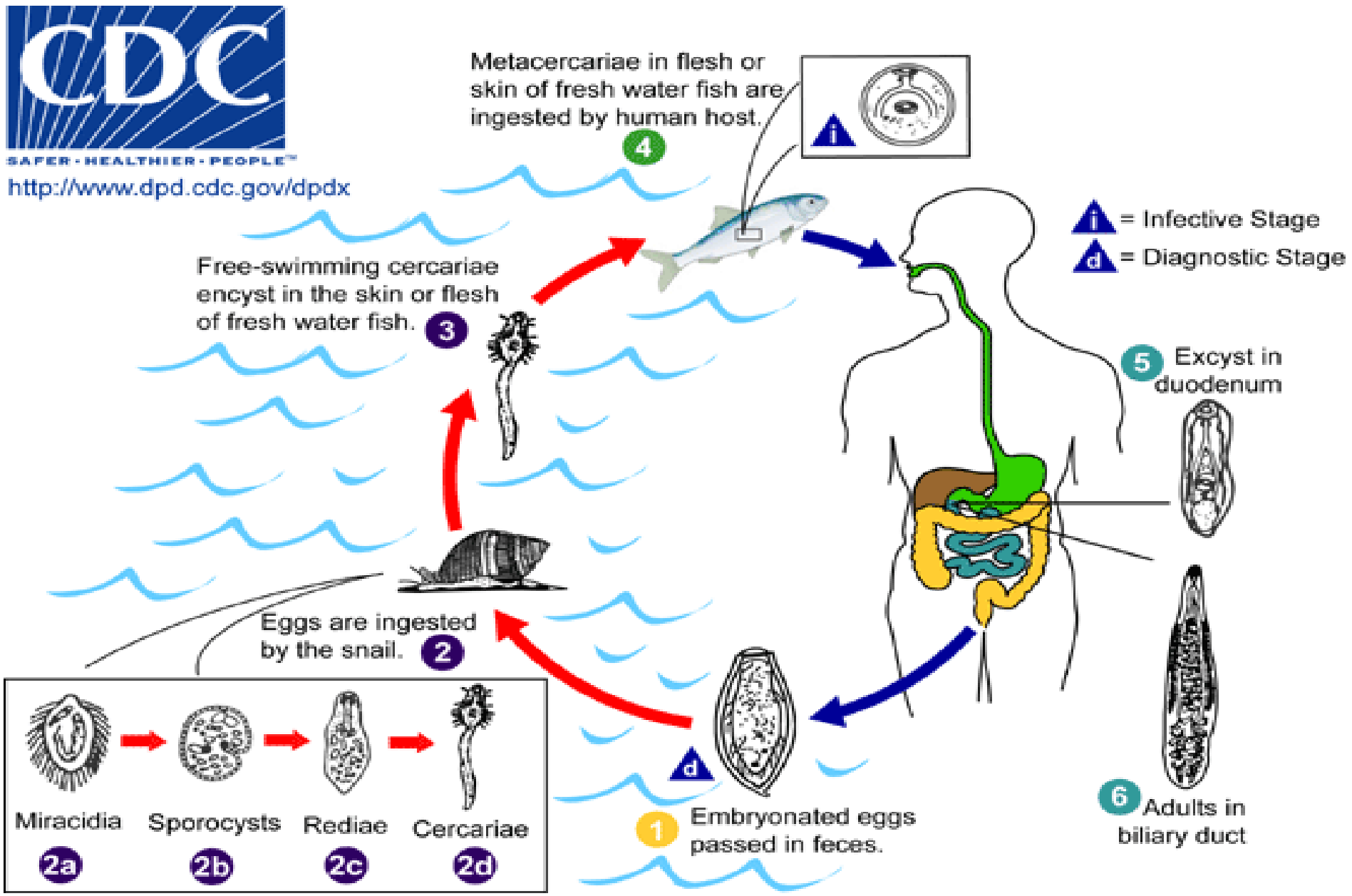



oral sucker
pharynx
vitellaria
seminal receptacle
intestine
uterus (eggs)
ovary
testes
excretory bladder

B- Egg:

- Size: Small 29x16 $\mathcal{M}$m
- Oval ,has operculum
- With shoulder
- Has small knob at the end of egg
- Content: Miracidium
- Color: Yellowish brown

Life cycle:


CDC
SAFER · HEALTHIER · PEOPLE™
http://www.dpd.cdc.gov/dpdx
Metacercariae in flesh or skin of fresh water fish are ingested by human host. 4
i
i = Infective Stage
d = Diagnostic Stage
Free-swimming cercariae encyst in the skin or flesh of fresh water fish. 3
5 Excyst in duodenum
Eggs are ingested by the snail. 2
Miracidia 2a
Sporocysts 2b
Rediae 2c
Cercariae 2d
d
1 Embryonated eggs passed in feces.
6 Adults in biliary duct

Paragonimus westermani
(Lung fluke)

Phylum: Platyhelimnthes
Class: Trematoda

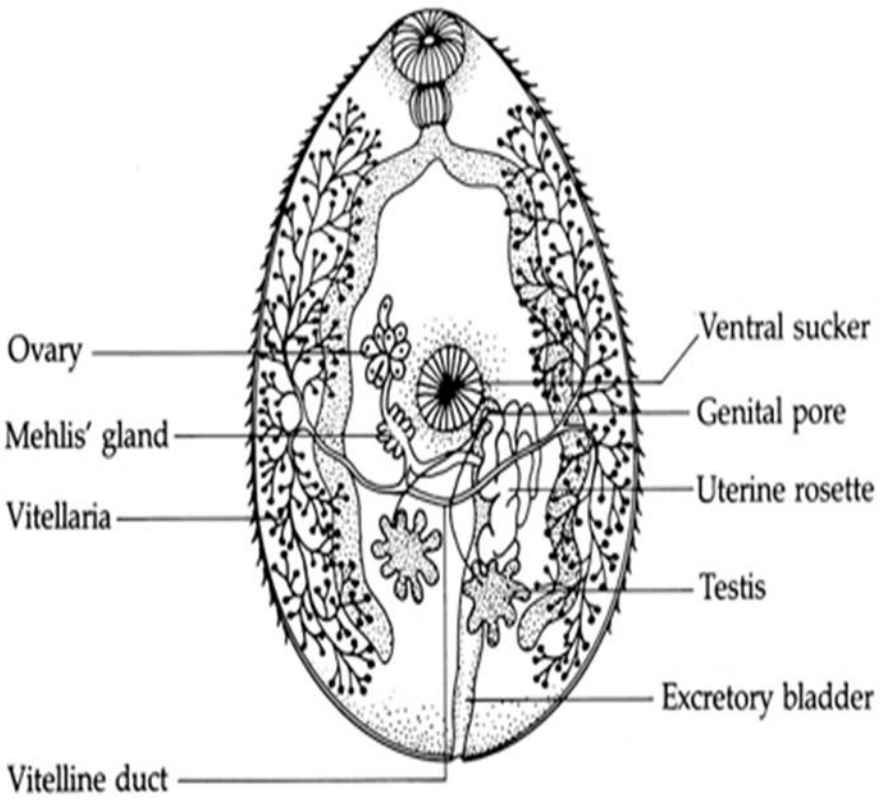
Paragonimus westermani
(Lung fluke)

- **Habitat:** cystic cavities in the lung
- **I.H:** first I.H is Snail – second I.H is fresh-water crabs.
- **D.H :** Man &crab eating animals .
- **Infective stage:** Encysted metacercaria.
- **Diagnostic stage :**Egg.
- **Mode of infection:** By ingestion fresh-water crabs containing encysted metacercaria.

Morphology:

A- adult:

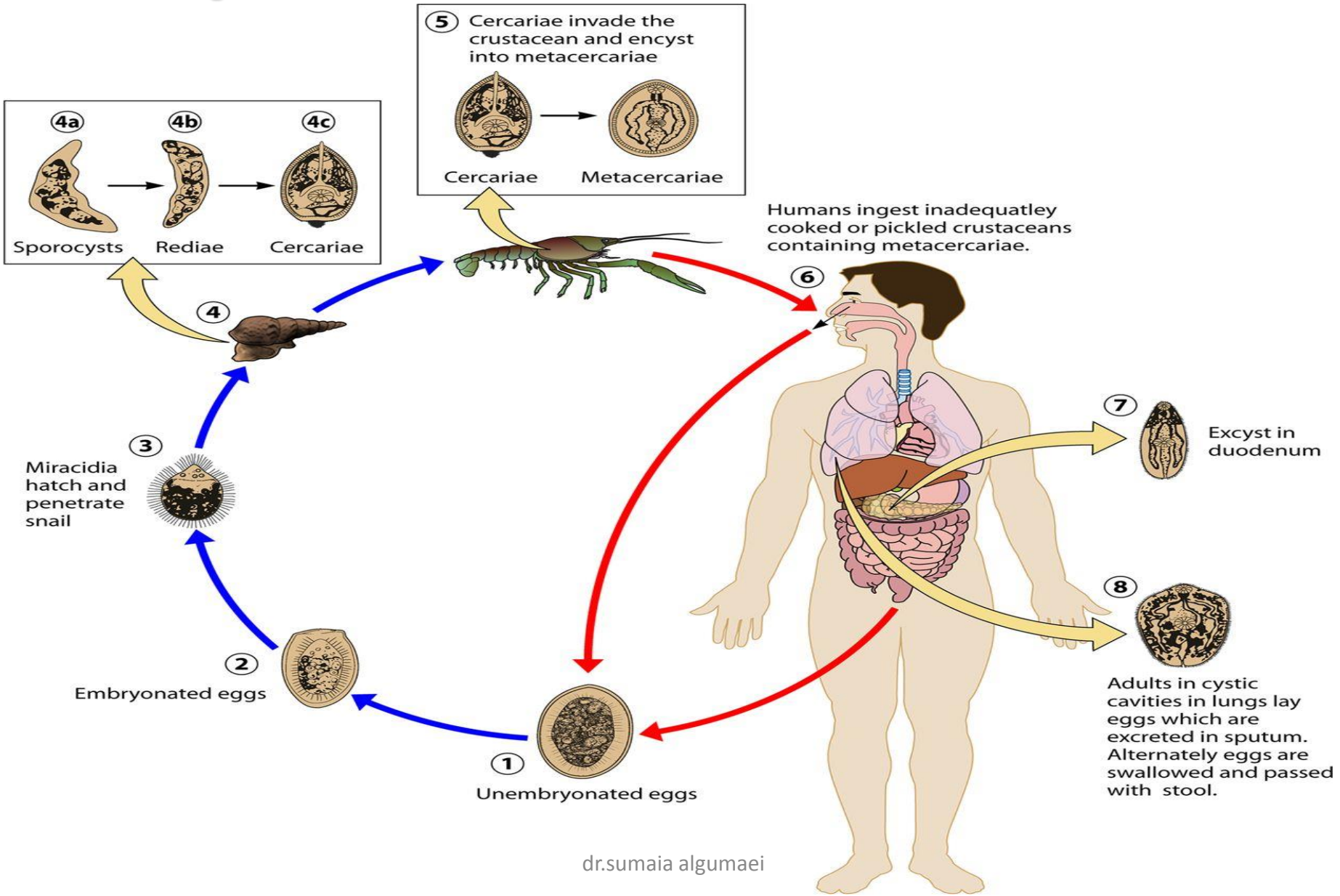
- 15x7 mm in size.
- Oval & brown
- oral sucker is sub terminal and Ventral sucker at the center of the body.
- Testes: two lobed in the posterior 1l3 of the body
- Ovary: branched in the postero-lateral to the ventral sucker


Ovary
Mehlis' gland
Vitellaria
Vitelline duct
Ventral sucker
Genital pore
Uterine rosette
Testis
Excretory bladder

B- Egg:

- Size: 90x50 $\mathcal{M}$
- Oval ,has operculum & thick shelled.
- With shoulder
- Content: immature ovum.
- Color: brown

Life cycle:


5 Cercariae invade the crustacean and encyst into metacercariae
Cercariae
Metacercariae
4a
4b
4c
Sporocysts
Rediae
Cercariae
Humans ingest inadequatley cooked or pickled crustaceans containing metacercariae.
6
4
3
Miracidia hatch and penetrate snail
7
Excyst in duodenum
8
2
Embryonated eggs
1
Unembryonated eggs
Adults in cystic cavities in lungs lay eggs which are excreted in sputum. Alternately eggs are swallowed and passed with stool.

Fresh-water Crabs

Class: Cestoda
(Tape worms)

General characters:

- Worms are tape or ribbon-like.
- They are segmented and covered by cuticle
- They have attachment apparatus(suckers or grooves called bothria)
- Body cavity ,alimentary canal are absent
- The body is composed of :scolex, neck& body(strobila)
- They are hermaphrodites
- Eggs are hexacanth embryos

Class: Cestoda (Tape worms)

Kingdom: Animal

Subkingdom: Metazoa

Phylum: Platyhelminthes

Class: Cestoidea

Sub-class: Cestoda

Order: **-Cyclophyllidea**

species: *Taenia saginata*

Taenia solium

Hymenolepis nana

Echinococcus granulusus

Pseudophyllidea

species: *Diphyllobothrium latum*

Taenia species

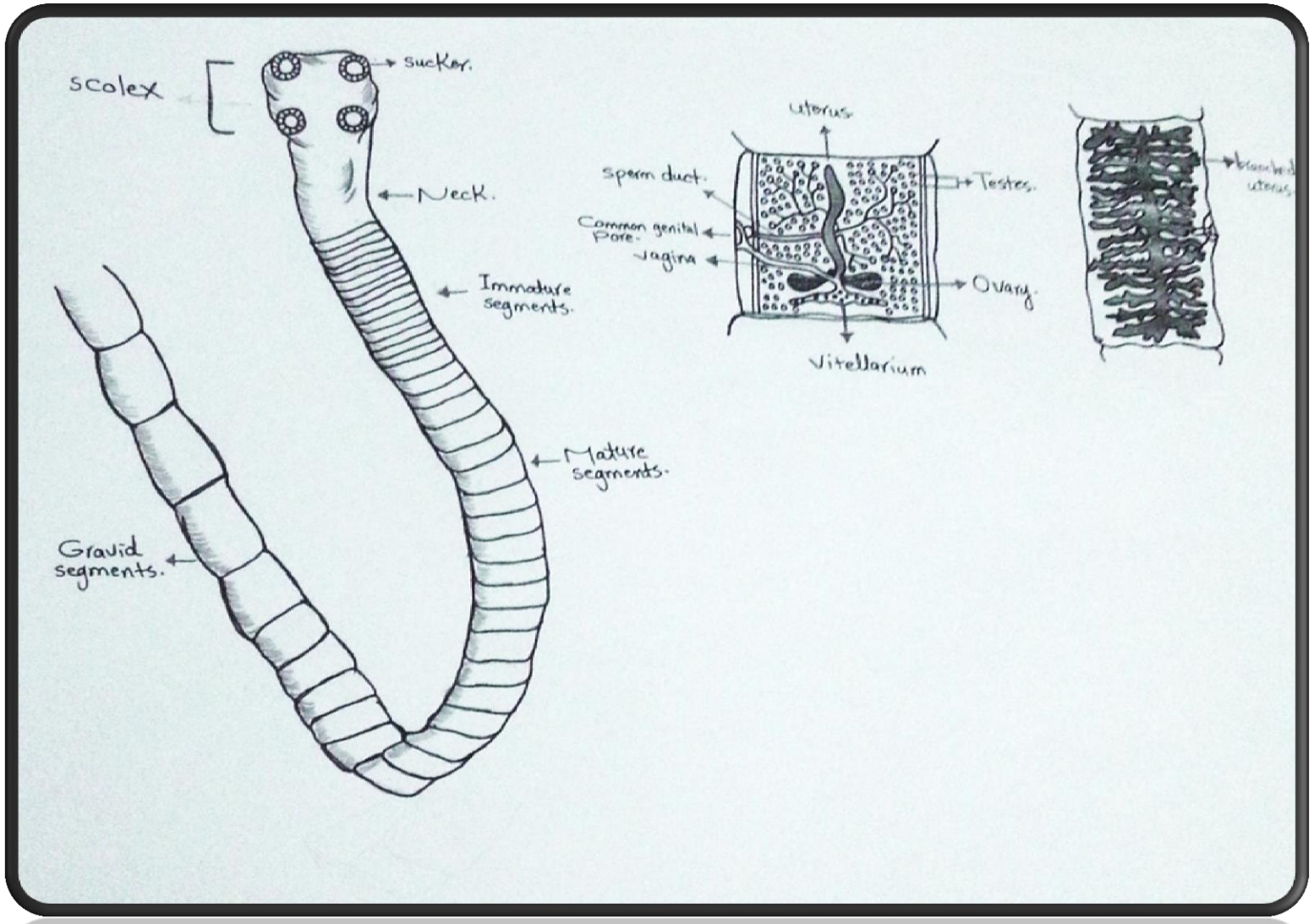
	Taenia saginata	*Taenia solium*
Common worm	Beef tape worm	Pork tape worm
Disease	Taeniasis saginata /beef tape worm infection	Taeniasis solium/pork tape worm infection
Habitat	Small intestine of man	Small intestine of man
I.H	Cattle	Pig
Infective stage	Cysticercus bovis	Cysticercus cellulosae
Mode of infection	By eating undercooked beef containing infective stage	By eating undercooked pork containing infective stage
Diagnostic stage	Egg ,segment	Egg ,segment

Morphology:

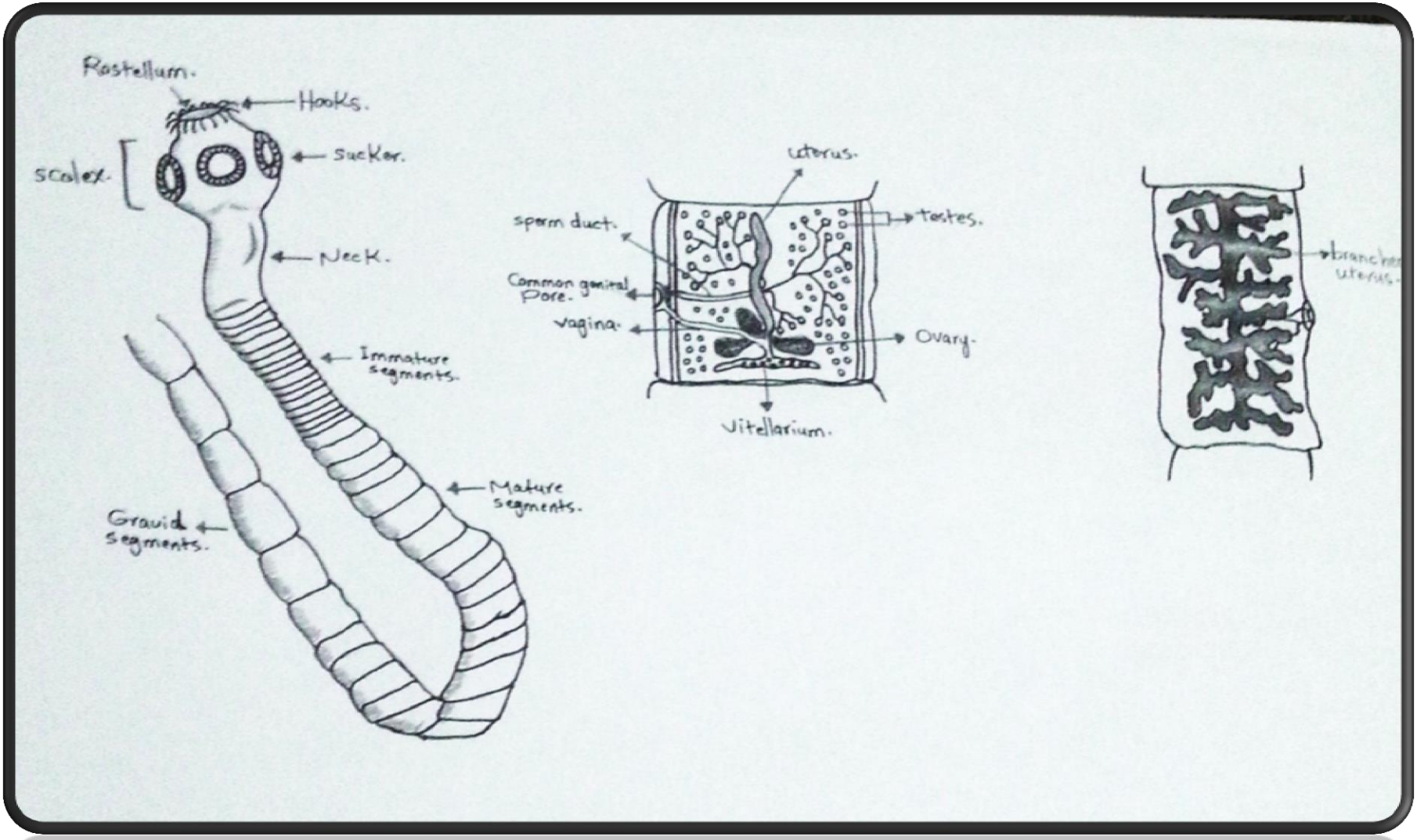
A- adult:

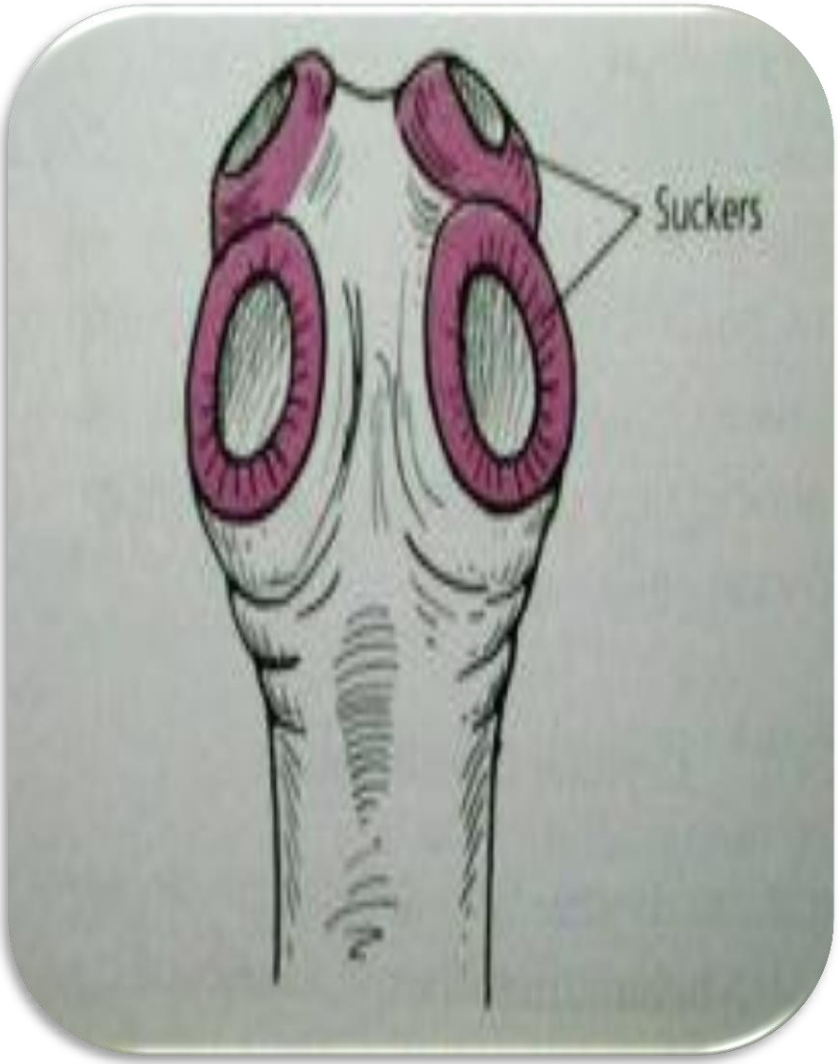
	Taenia saginata	*Taenia solium*
Size	4- 10 meters	2-4 meters
Scolex	Globular with 4 suckers	Has a rostellum and two rows of hooks
Testes	Multiple small follicles(300-400)	Multiple small follicles(200)
Ovary	Bilobed in the posterior part	Trilobed in the posterior part
Gravid segment	Longer and broad The uterus with lateral branches on each side(15-30)	Uterus with(7-13)lateral branches

Taenia saginata

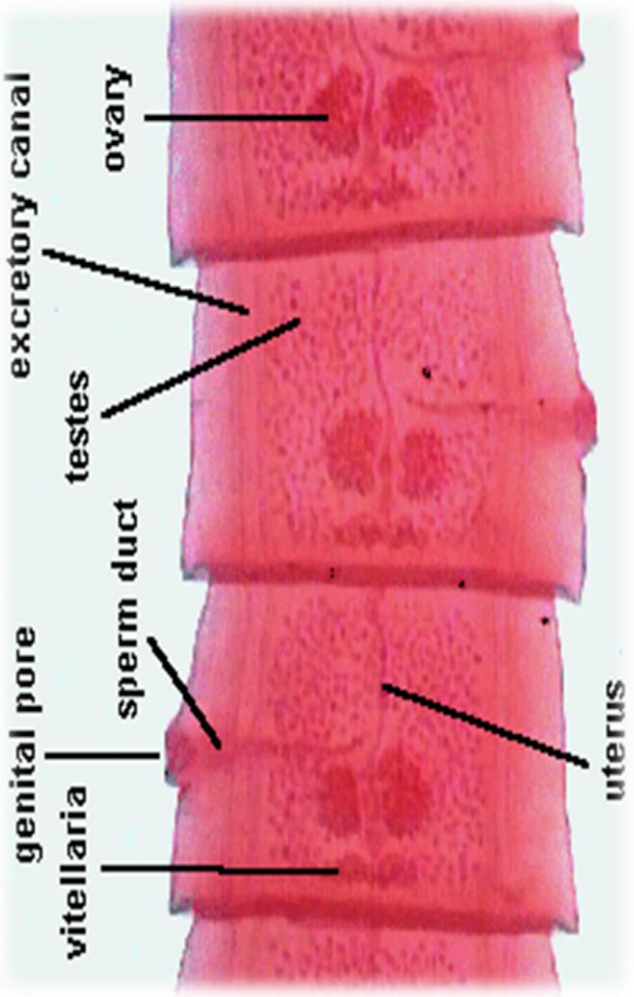


Taenia solium

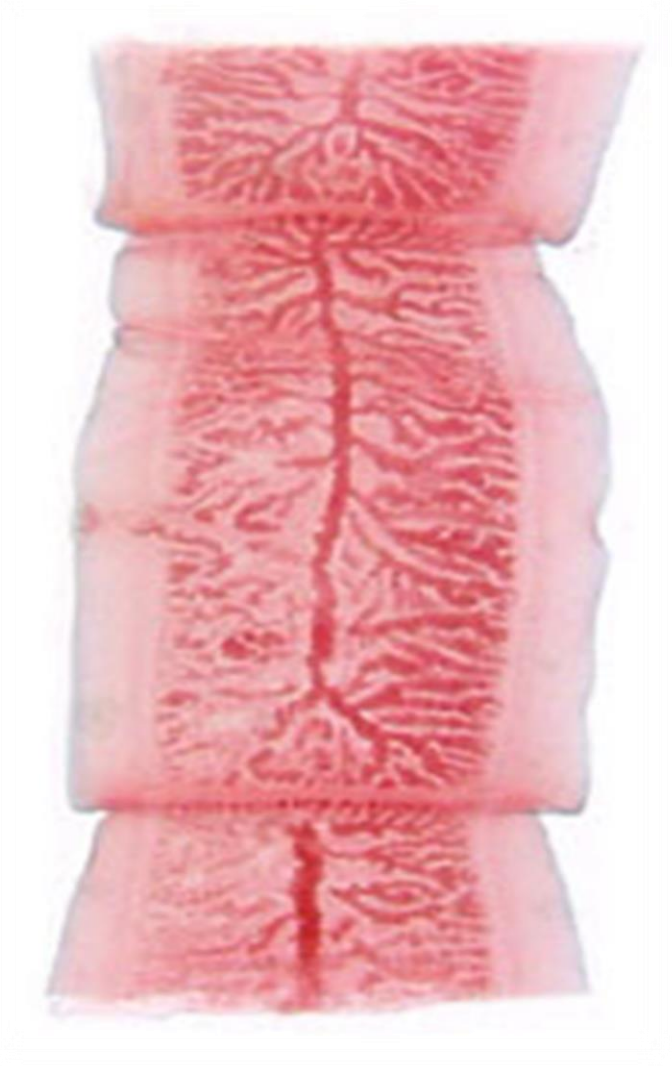




Scolex of *Taenia saginata*

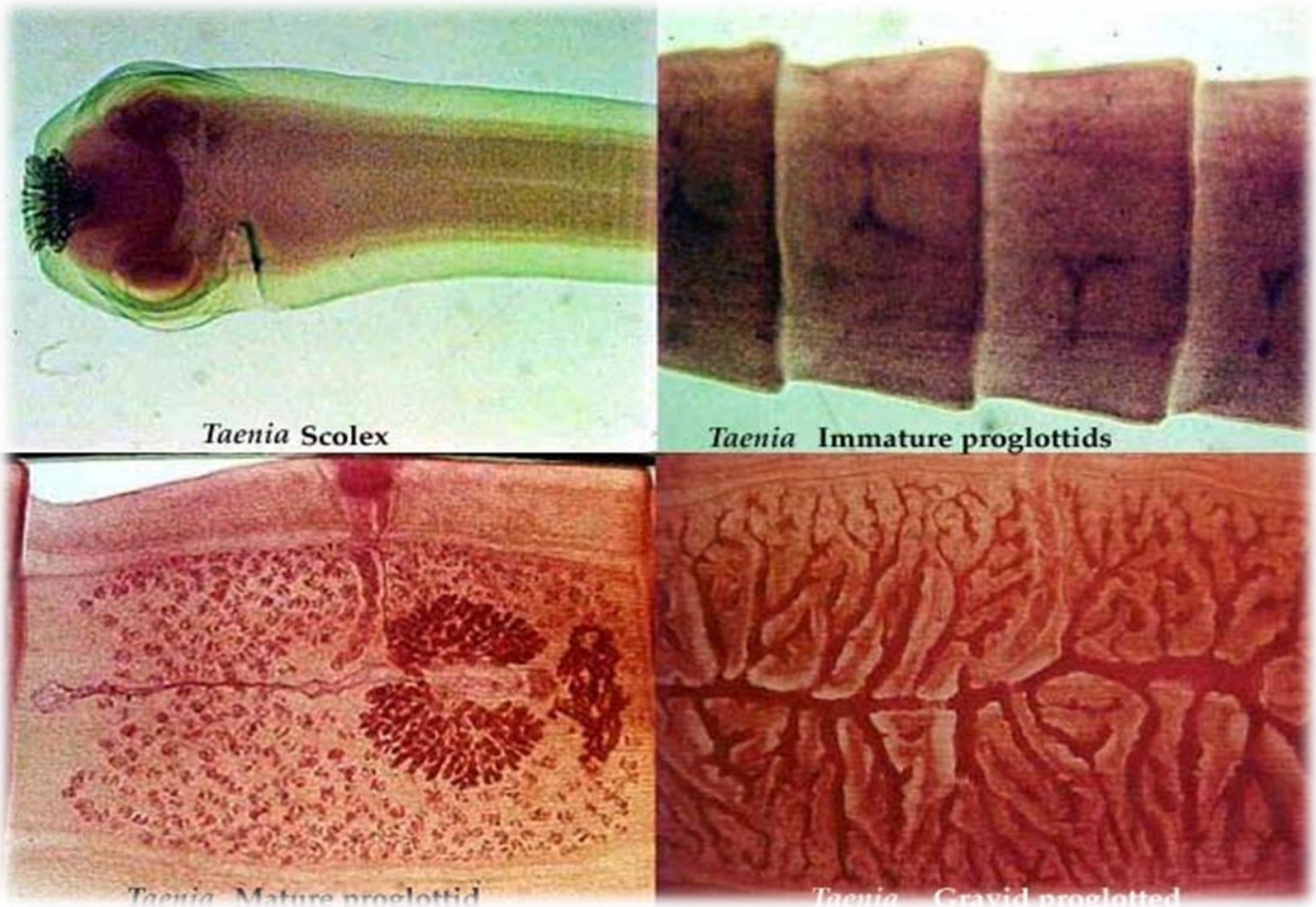


Mature segment



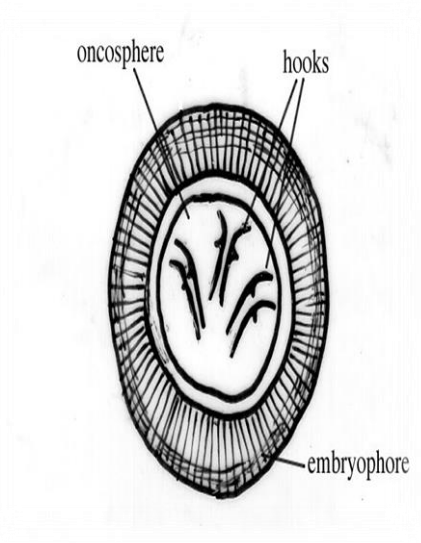
Gravid segment

Scolex of *Taenia solium*

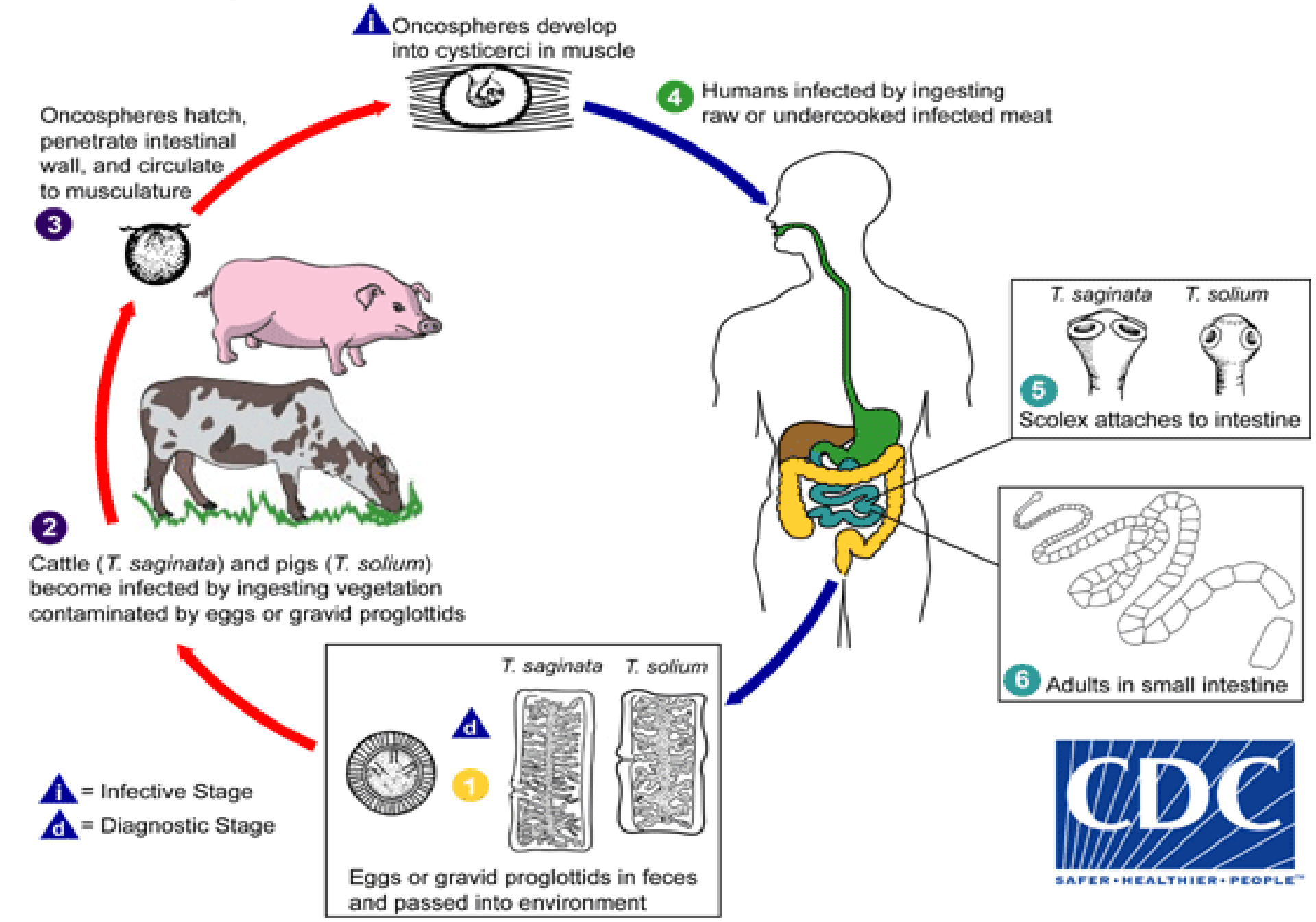

Taenia Scolex
Taenia Immature proglottids
Taenia Mature proglottid
Taenia Gravid proglotted

B- Egg:

- **Size:** 40 *m*
- **Shape:** rounded with radial striated shell
- **Color:** brown
- **Content:** hexacanth onchosphere (6-hooked embryo)



Life cycle:


i Oncospheres develop into cysticerci in muscle
4 Humans infected by ingesting raw or undercooked infected meat
Oncospheres hatch, penetrate intestinal wall, and circulate to musculature
3
T. saginata
T. solium
5 Scolex attaches to intestine
2 Cattle (T. saginata) and pigs (T. solium) become infected by ingesting vegetation contaminated by eggs or gravid proglottids
6 Adults in small intestine
T. saginata
T. solium
d
1
Eggs or gravid proglottids in feces and passed into environment
i = Infective Stage
d = Diagnostic Stage
CDC
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Hymenolepis nana **(Dwarf tape worm)**

Phylum: Platyhelminthes

Class: Cestoda

Hymenolepis nana
(Dwarf tape worm)

- **Disease :** Hymenolepiasis , dwarf tape worm infection.
- **G.D:** Cosmopolitan ,more common in worm climate .
- **Habitat :** Adult in Small intestine ,larva embedded in the villi.
- **D.H & I.H :** Human
- **diagnostic and Infective stage:** Egg
- **Mode of infection:**

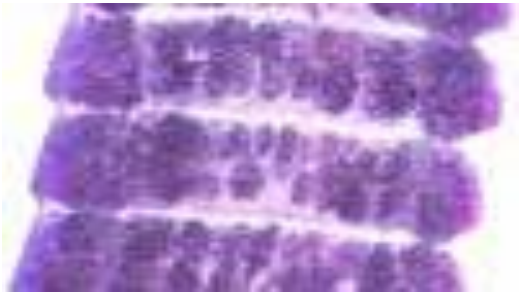
1- Autoinfection(fecal-oral route)

2- Through ingestion of egg in contaminated food or water.

Morphology:

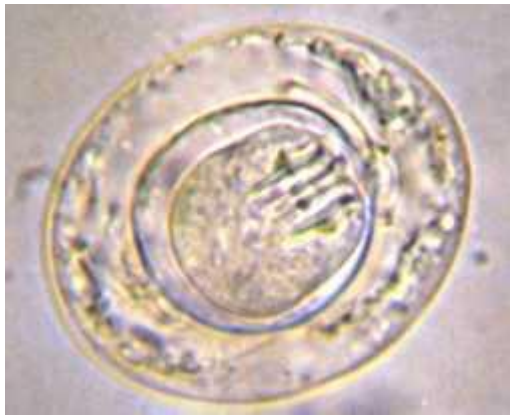
A-Adult:

- **Size:** 1 cm x 1mm
- **Scolex:** Globular with rostellum with one raw of circular hooks.
- **Mature segment:** broader than long three rounded testes &one ovary in the center of segment.
- **Gravid segment:** broader than long Ueterus is a sac full of eggs.

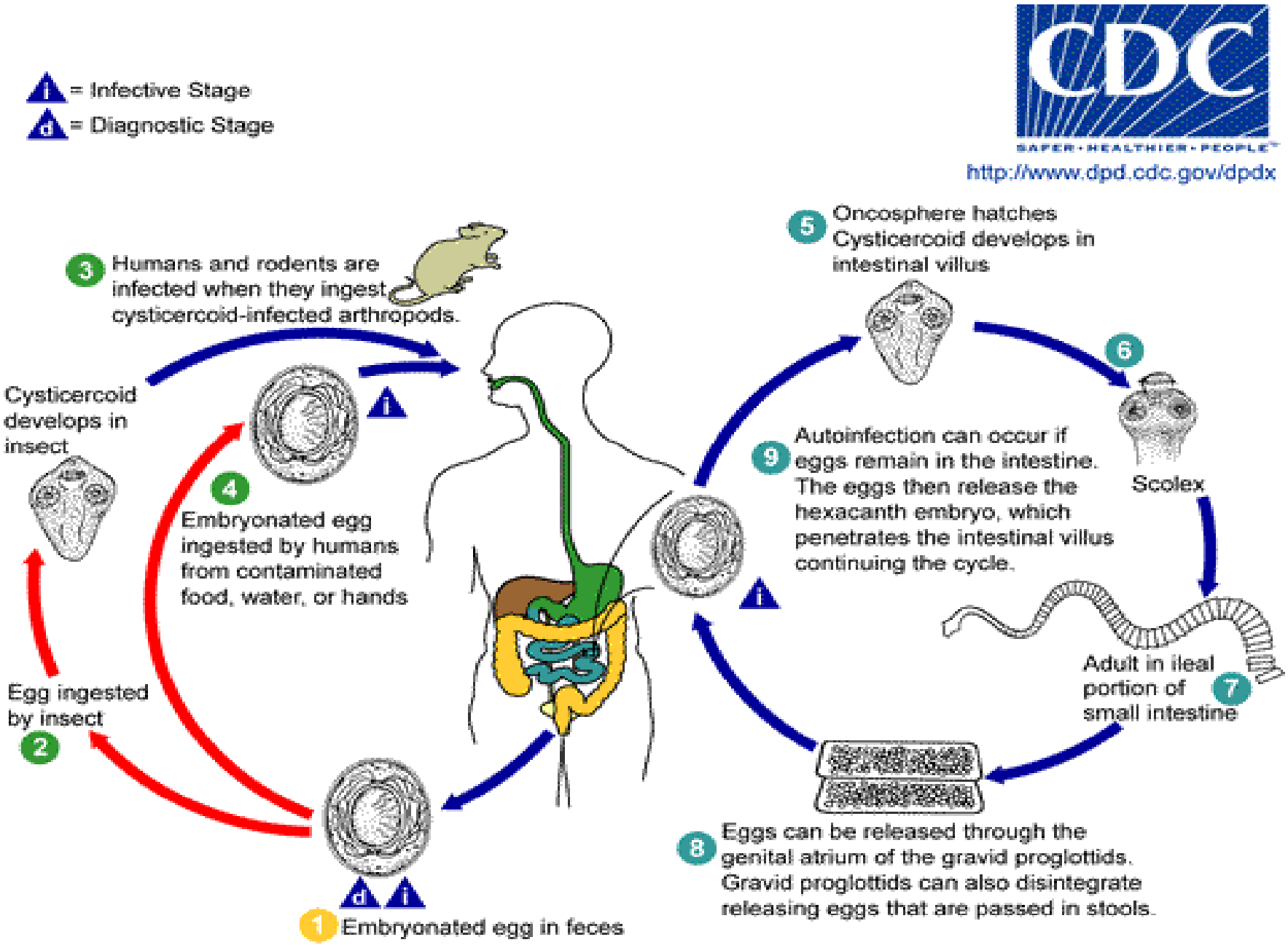


B- Egg:

- **Size:** 30-50 μ
- **Shape:** rounded with two polar thickening from each arises 4-8 filaments.
- **Color:** Translucent.
- **Content:** hexacanth onchosphere (6-hooked embryo)



Life cycle:


i = Infective Stage
d = Diagnostic Stage
CDC
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http://www.dpd.cdc.gov/dpdx
1 Embryonated egg in feces
2 Egg ingested by insect
3 Humans and rodents are infected when they ingest cysticercoid-infected arthropods.
4 Embryonated egg ingested by humans from contaminated food, water, or hands
5 Oncosphere hatches Cysticercoid develops in intestinal villus
6 Scolex
7 Adult in ileal portion of small intestine
8 Eggs can be released through the genital atrium of the gravid proglottids. Gravid proglottids can also disintegrate releasing eggs that are passed in stools.
9 Autoinfection can occur if eggs remain in the intestine. The eggs then release the hexacanth embryo, which penetrates the intestinal villus continuing the cycle.
Cysticercoid develops in insect

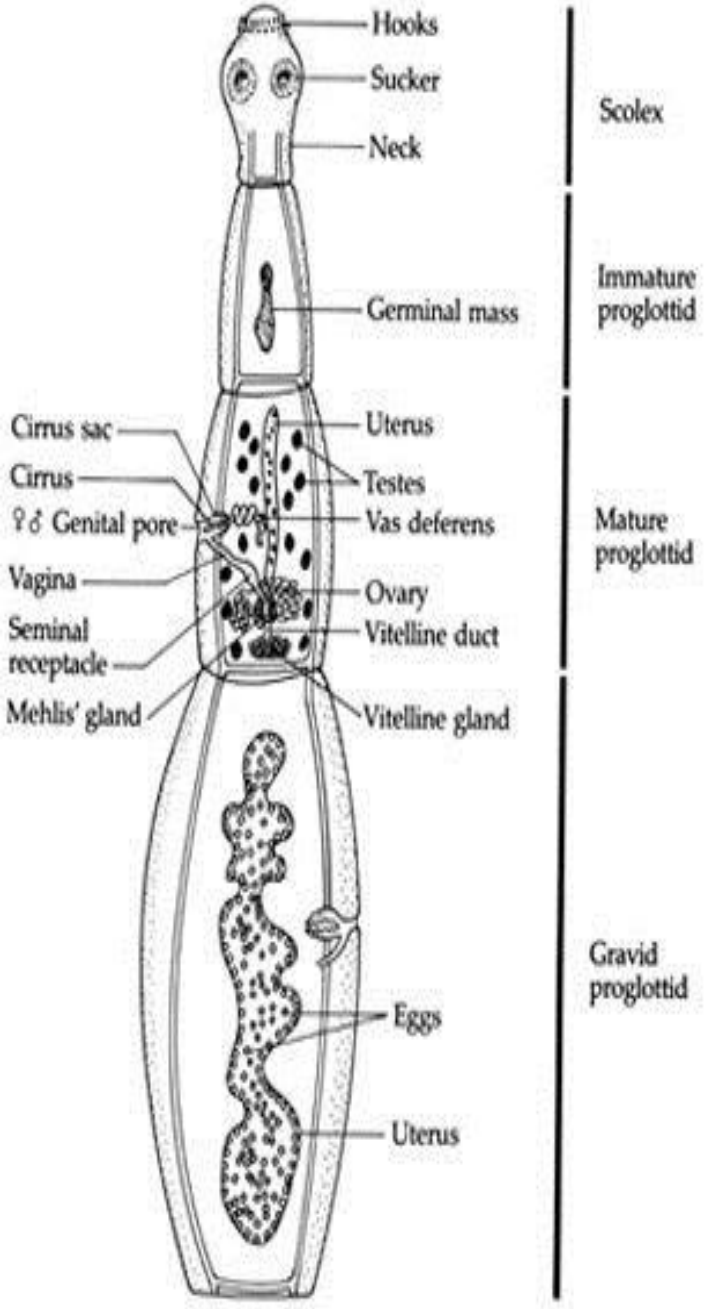
Echinococcus granulusus
Hydatid disease

- **Disease:** Hydatid disease (Echinococcosis)
- **D.H:** Dogs & canines
- **I.H:**Man or sheep
- **Habitat:**adult ⟶ Small intestine of dogs
  cyst ⟶ Hydatid cysts are found in liver of man (70%),followed by lung(24%),and then the kidney (3%),bone (2%) and brain(1%),
- **Infective stage for man:** Egg
- **Diagnostic stage:** Hydatid cyst

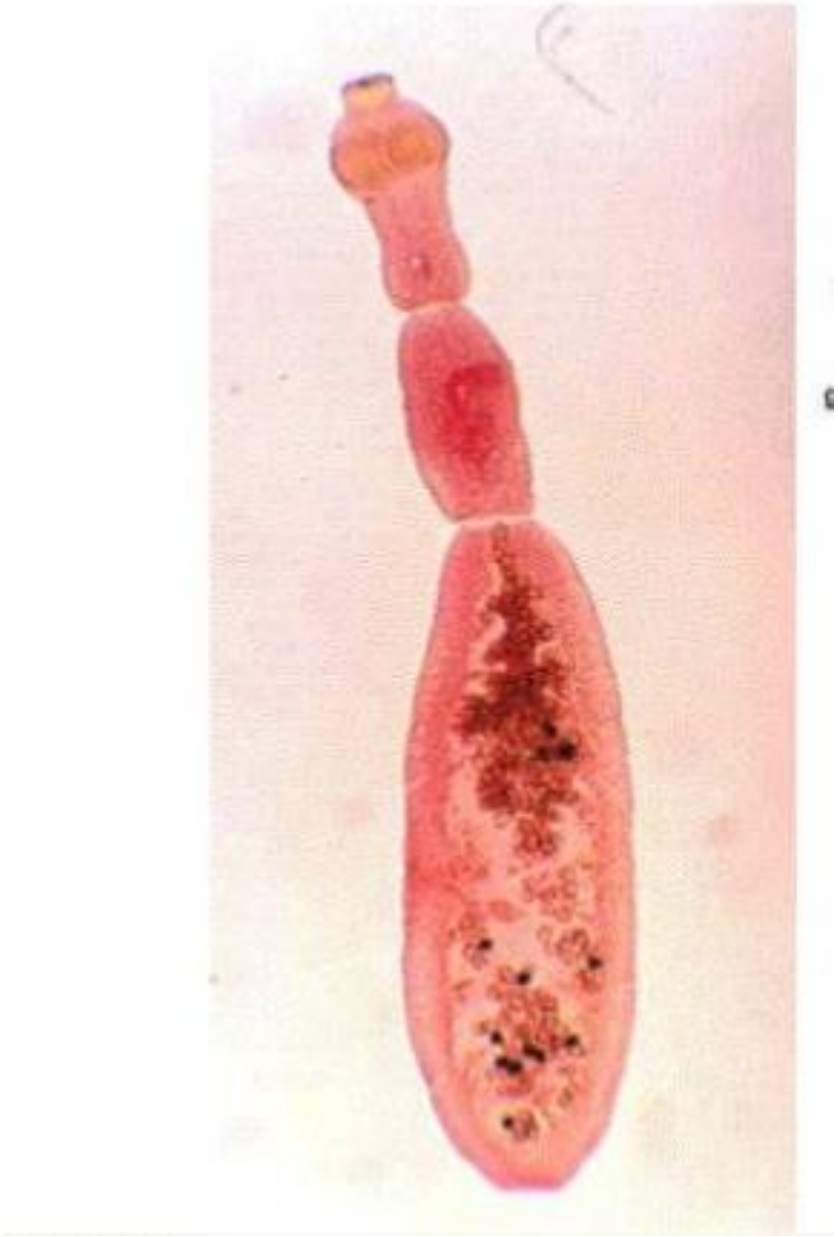
Morphology:

A- adult:

- Is the smallest tape worm (about 5mm)
- Scolex is globular with 4 suckers and rostellum carring 2 circles of hooks.
- The body composed of head,neck,body
- Body: three prolottide (immature, mature &gravid segment)

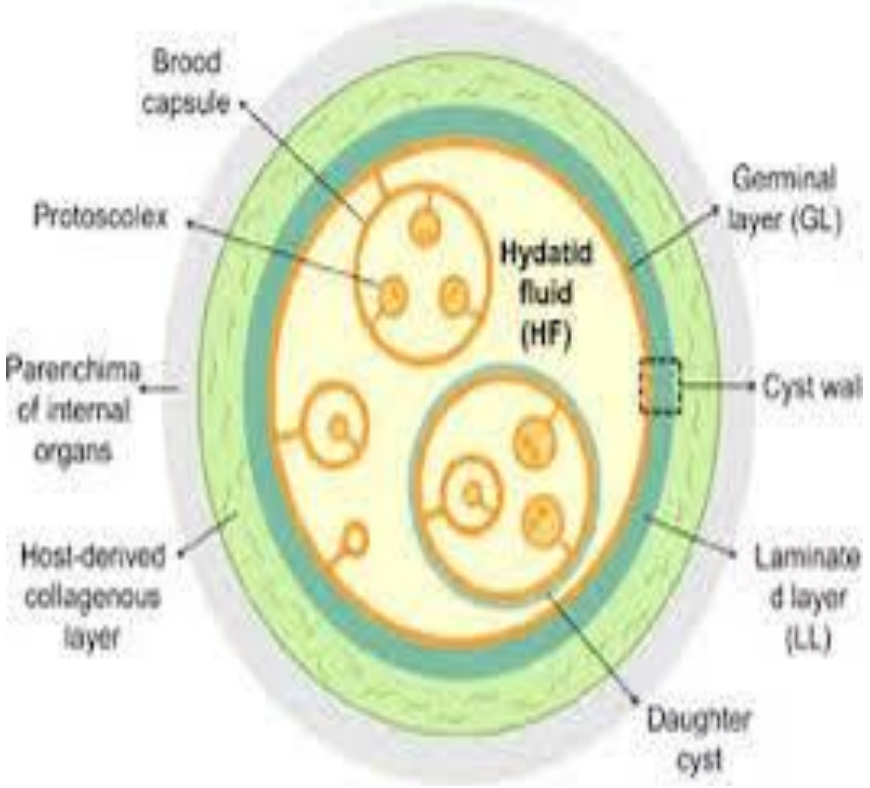


E. granulosus

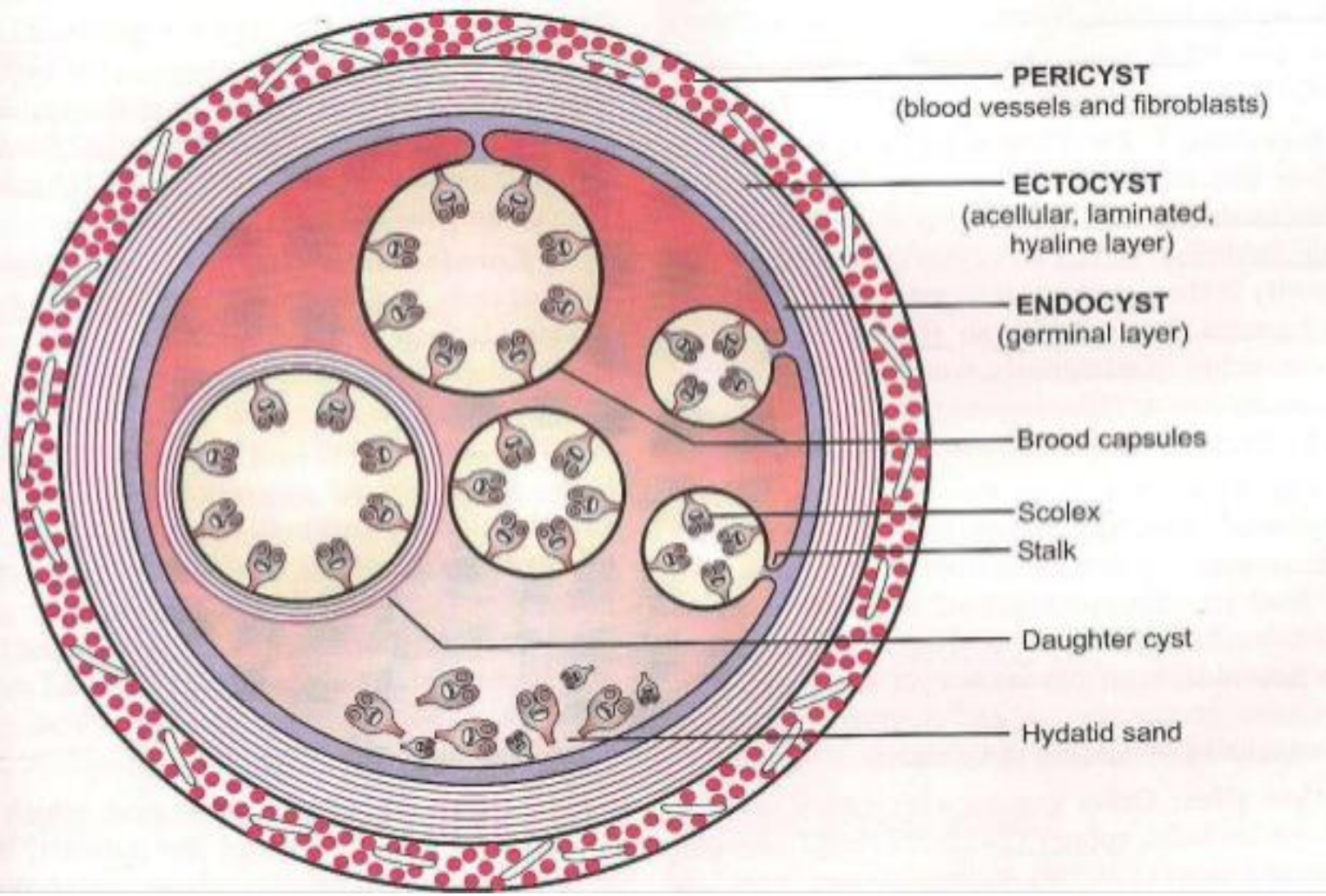


B-Hydatid cyst:

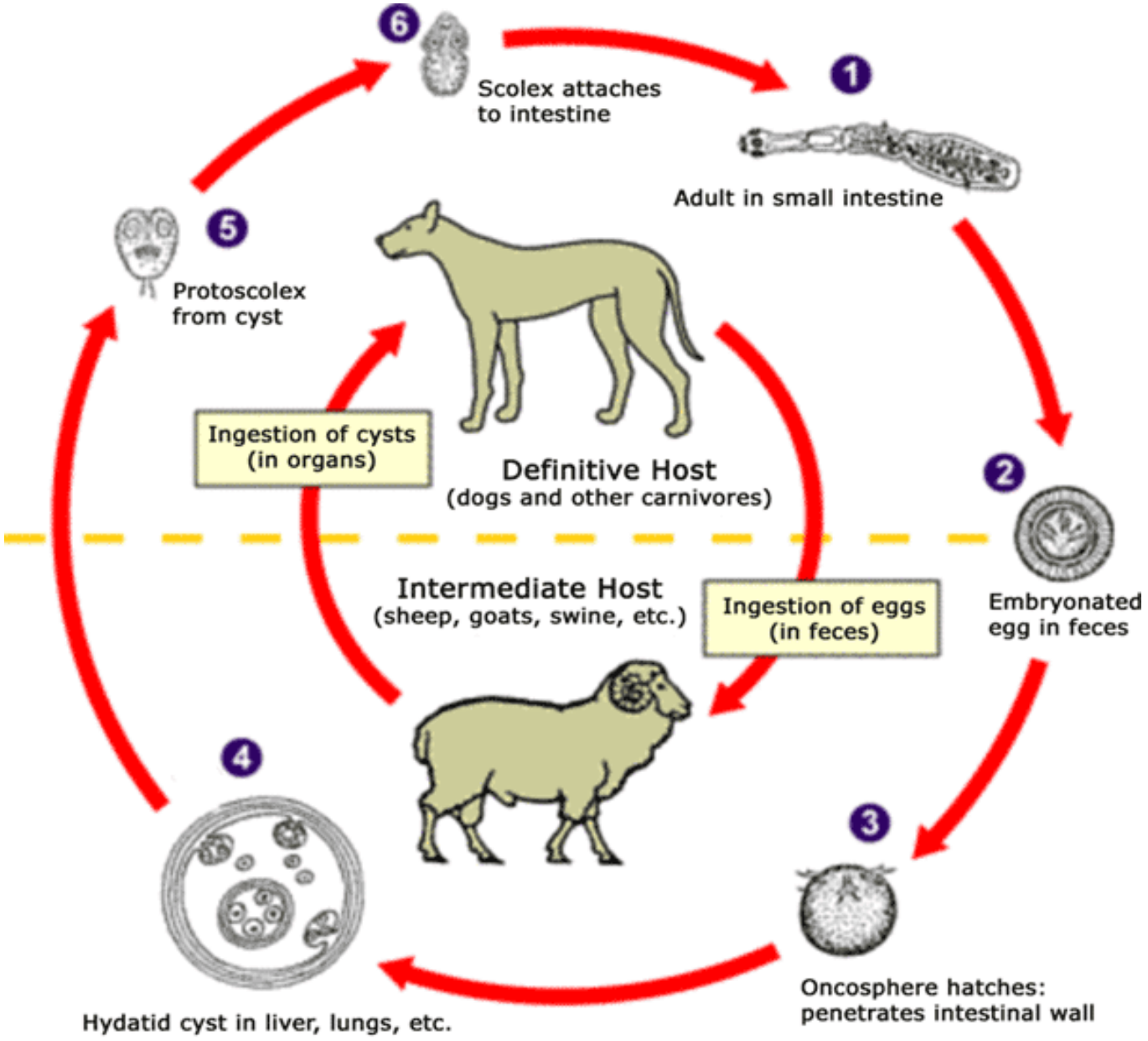
- Size :1-10 cm
- Shape:spherical



Hydatid cyst:



Life cycle:


6
Scolex attaches to intestine
1
Adult in small intestine
5
Protoscolex from cyst
Ingestion of cysts (in organs)
Definitive Host
(dogs and other carnivores)
2
Embryonated egg in feces
Intermediate Host
(sheep, goats, swine, etc.)
Ingestion of eggs (in feces)
4
3
Hydatid cyst in liver, lungs, etc.
Oncosphere hatches: penetrates intestinal wall

Diphyllobothrium latum
broad tape worm

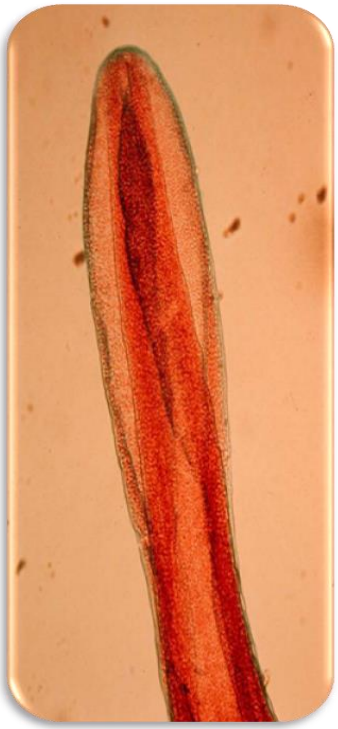
Phylum: Platyhelimnthes

Class: cestoda

Diphyllobothrium latum (broad tape worm)

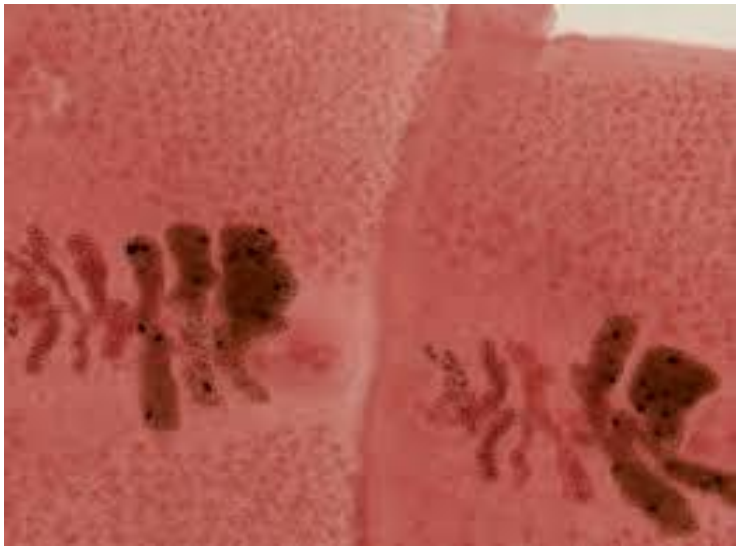
- **Habitat**: Small intestine of ma (D.H)&fish eating animals (reservoir host).
- **I.H:** First I.H is fresh-water crustacean – second I.H is fish(as salmon).
- **D.H :** man.
- **Infective stage:** Plerocercoid larva.
- **Diagnostic stage :**Egg.
- **Mode of infection:** By ingestion undercooked fish containing plerocercoid larva.

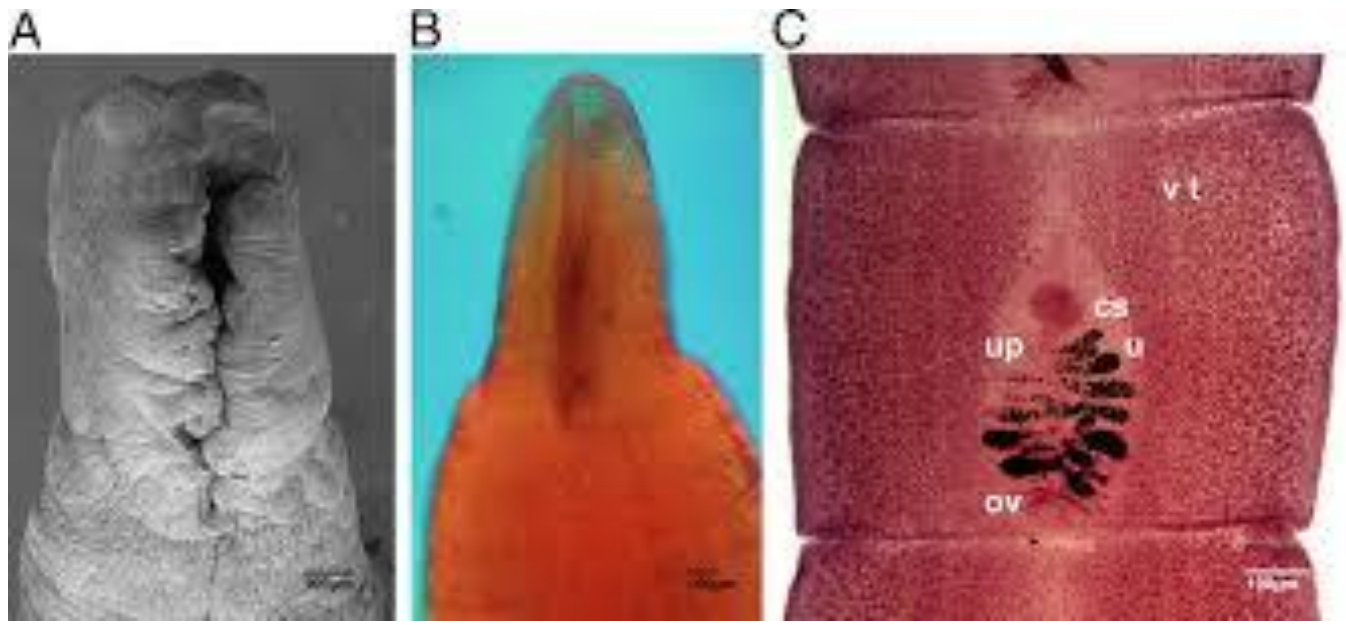
Morphology:



A- adult:

- 3-10 meters
- Scolex: elongated, almond-shaped with grooves(bothria)
- Mature segment: broder than long.
- Testes: multiple .
- Ovary: bilobed in the posterior part.
- Uterus :rosette-shaped in the middle of the segment.




A
B
C
v.t
cs
up
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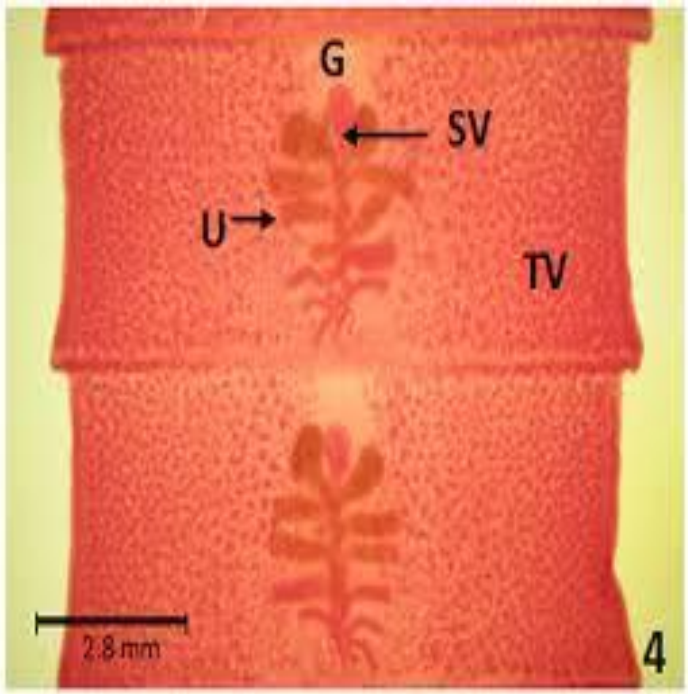
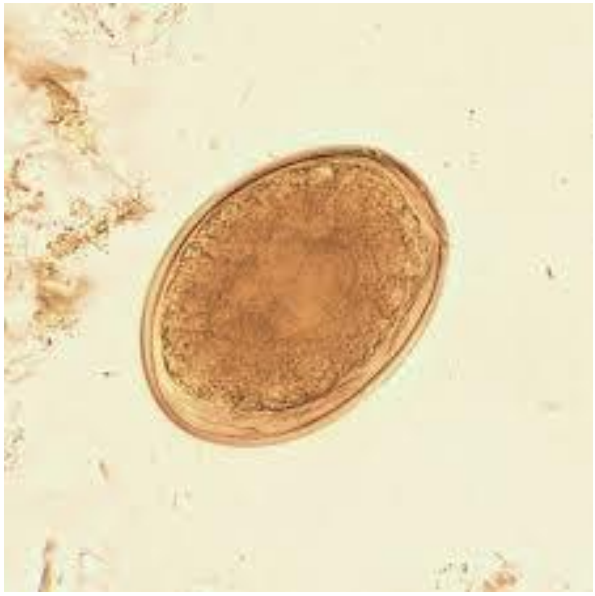
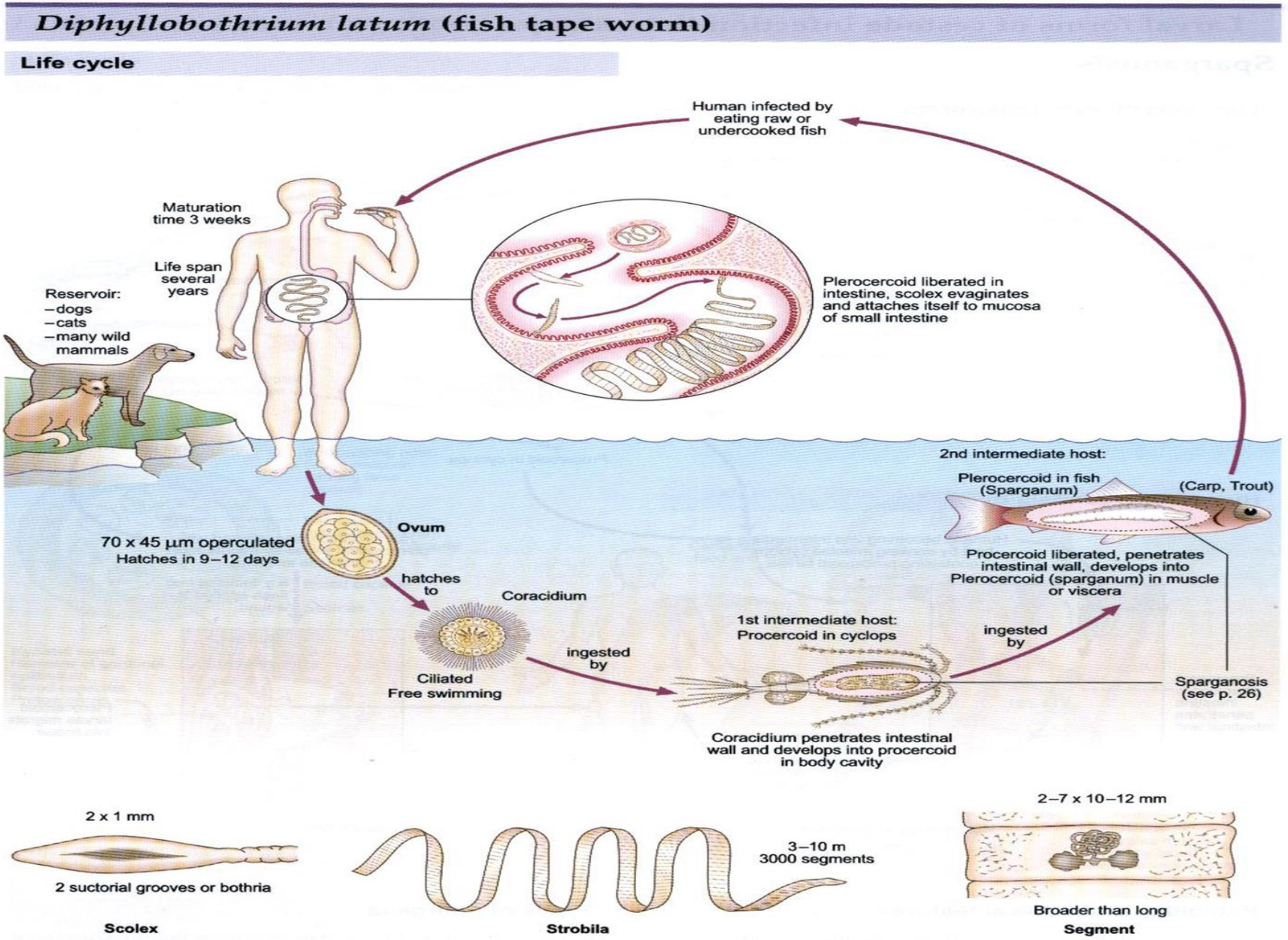

G
SV
U
TV
2.8 mm
4

B- Egg:

- Size: 50𝓜
- Oval ,has operculum& thick shell
- Content: immature ovum
- Color: yellowish brown



Life cycle:


Diphyllobothrium latum (fish tape worm)
Life cycle
Human infected by eating raw or undercooked fish
Maturation time 3 weeks
Life span several years
Reservoir:
–dogs
–cats
–many wild mammals
Plerocercoid liberated in intestine, scolex evaginates and attaches itself to mucosa of small intestine
2nd intermediate host:
Plerocercoid in fish (Sparganum)
(Carp, Trout)
Procercoid liberated, penetrates intestinal wall, develops into Plerocercoid (sparganum) in muscle or viscera
Ovum
70 x 45 µm operculated
Hatches in 9–12 days
hatches to
Coracidium
Ciliated
Free swimming
ingested by
1st intermediate host:
Procercoid in cyclops
ingested by
Sparganosis (see p. 26)
Coracidium penetrates intestinal wall and develops into procercoid in body cavity
2 x 1 mm
2 suctorial grooves or bothria
Scolex
3–10 m
3000 segments
Strobila
2–7 x 10–12 mm
Broader than long
Segment

fresh-water crustacean

Class: Nematoda (round worms)

General characters:

- Cylindrical elongated &un-segmented.
- Separate sexes.
- Posterior end of male is curved.
- Posterior end of female is straight.
- Has body cavity.

Dr.Sumaia algumaei

Ascaris lumbericoides
(Giant intestinal worm)

- **Phylum:** Nemathelminthes
- **Class:** Nematoda
- **Disease:** Ascariasis, ascaris infection
- **G.D:** Cosmopolitan, common in children
- **D.H:** Man only
- **Habitat:** lumen of small intestine
- **Infective stage:** mature egg
- **Diagnostic stage:** Egg in stool & adult worm in heavy infection.
- **Mode of infection:** through ingestion of mature egg in contaminated vegetables or water.

Morphology:

A- Adult:

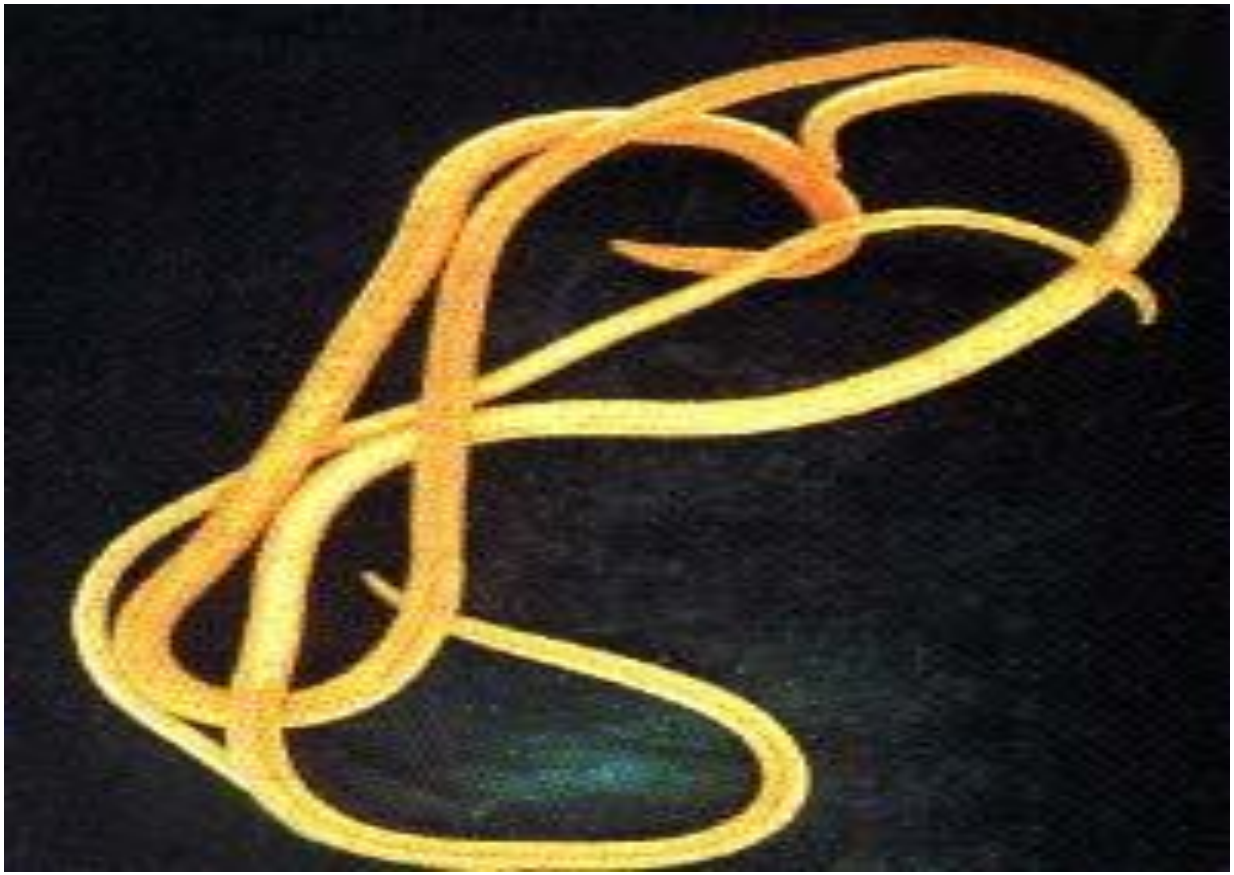
- ✓ **cylindrical in shape**
- ✓ **creamy-white or pinkish in color**

➢ **Male:**

- About 20 cm in length
- Posterior end is curved with two retractile spicules.

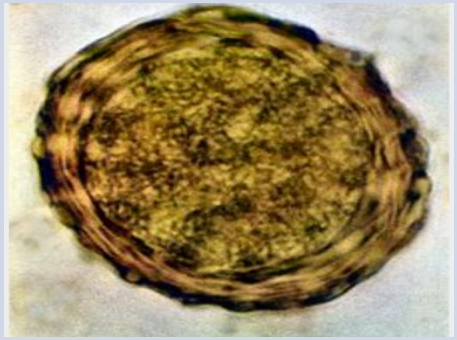
➢ **Female:**

- About 25 cm in length
- Posterior end is straight

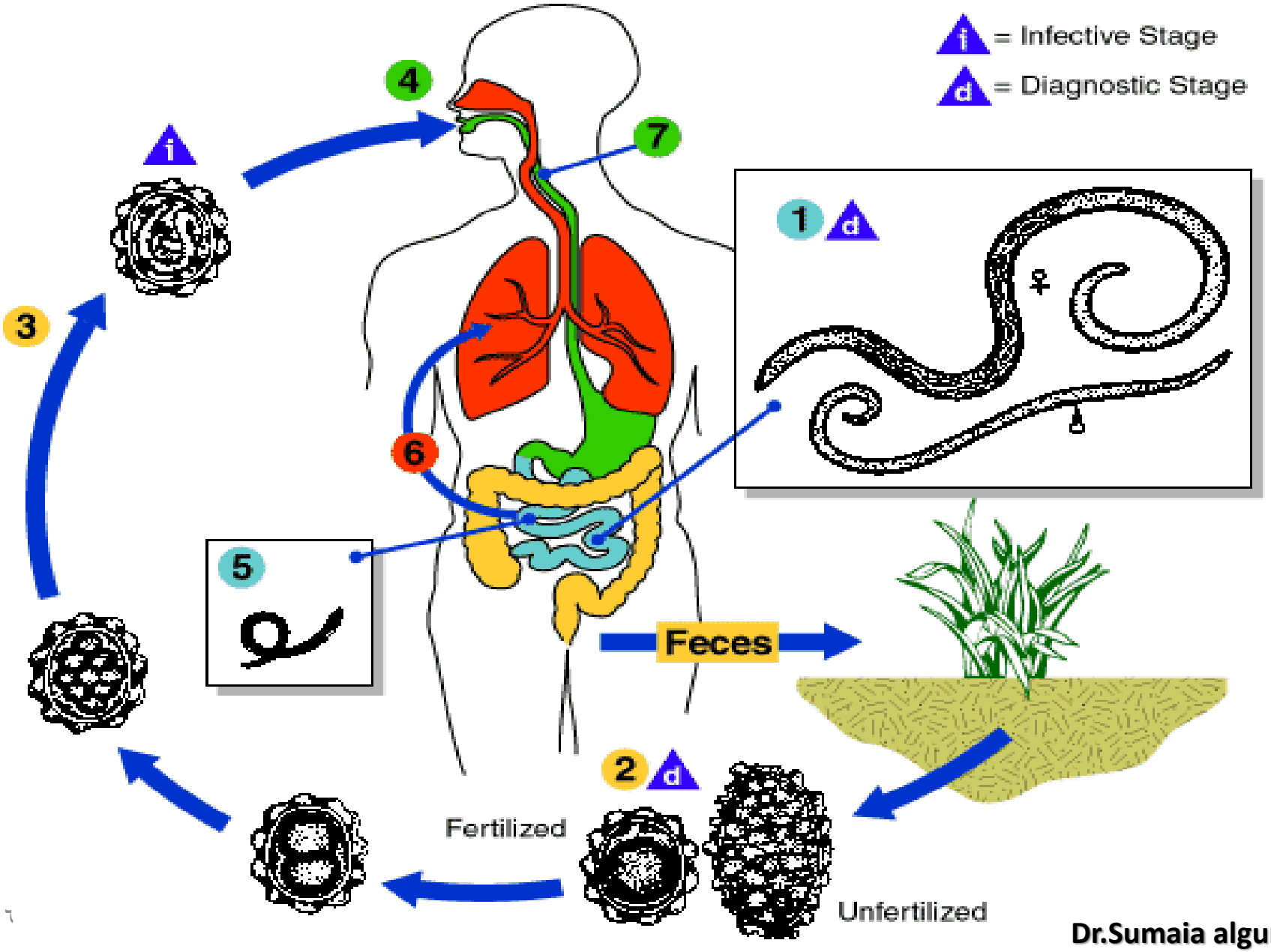


Adult worm of *Ascaris lumbericoides*

B- Eggs:

	Fertilized egg	Unfertilized egg	Decorticated egg
Size **Shape** **Content** **color**	60x45 Rounded to oval, thick layer covered by mammillated coat Immature ovum Yellowish brown 	90x45 Longer and narrow with ill developed mammillation Refractile granules Yellowish brown 	fertilized egg but without mammillation

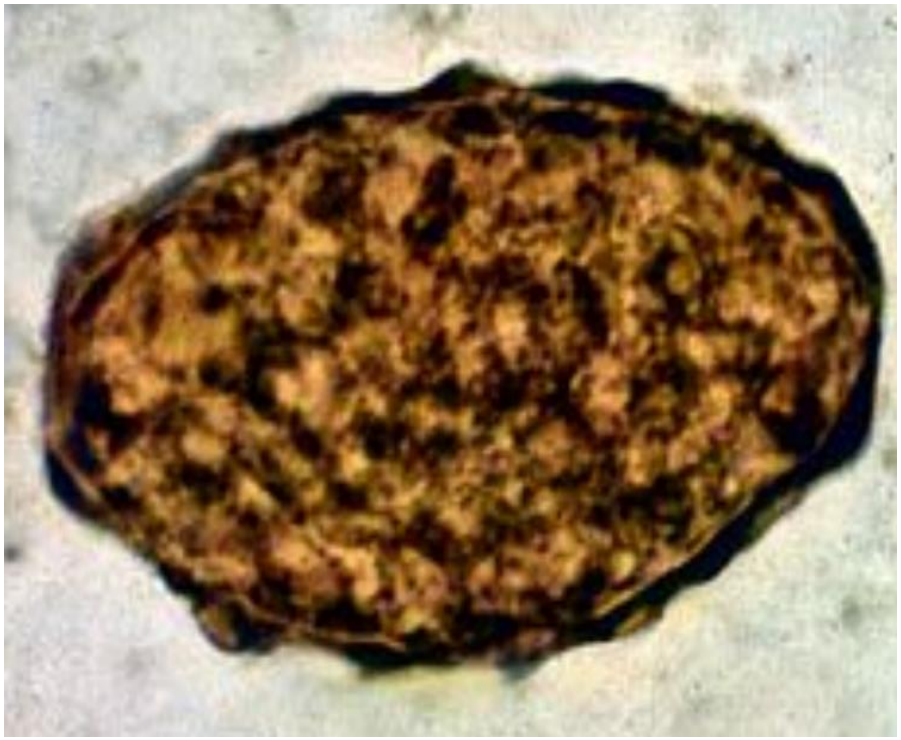
Life cycle:



Dr.Sumaia algumaei

Fertilized egg of *Ascaris lumbericoides*

Dr.Sumaia algumaei



UnFertilized egg of *Ascaris lumbericoides*

Decorticated egg of *Ascaris lumbericoides*

Enterobius vermicularis (Pin worm)

- **Phylum:** Nemathelminthes
- **Class:** Nematoda
- **Disease:** Oxyuriasis,Enterobiasis
- **G.D:** Cosmopolitan, common in children
- **D.H:** Man only
- **Habitat:** Large intestine (Caecum)
- **Infective stage:** egg
- **Diagnostic stage:** Egg & adult worm in stool.
- **Mode of infection:**

  1- Autoinfection(hand to mouth transmission).

  2- Inhalation of air borne eggs in dust.

  3- Retroinfection.

  4-Ingestion of egg in contaminated food or water

Morphology:

A- Adult:

✓ Small , spindle – shaped worm

✓ 2 Cuticular wing like expansions at The anterior end.

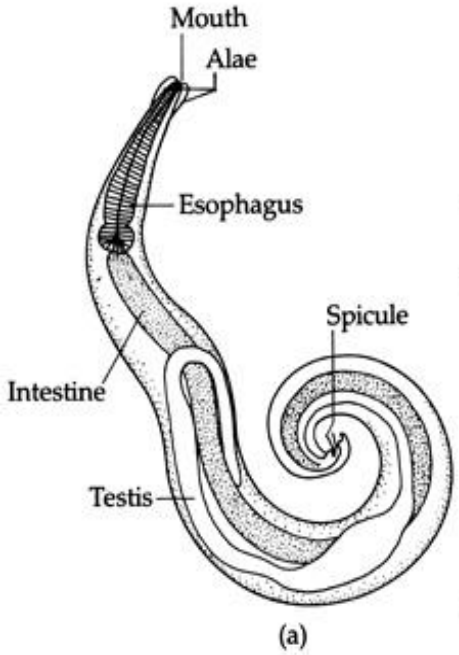
✓ Oesophagus (double bulbed)

➢ Male:

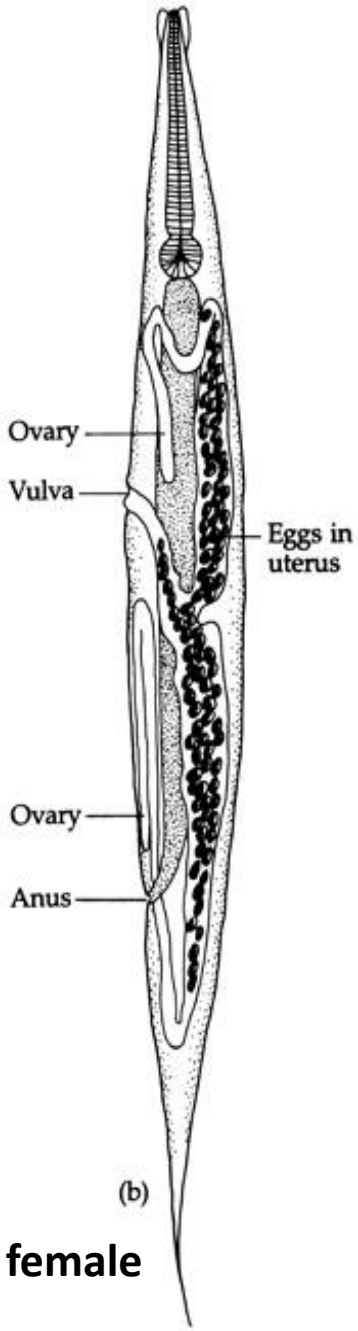
- About 5 mm in length
- Posterior end is curved.

➢ Female:

- About 10 mm in length
- Posterior end is straight with long pointed tail.



Adult male



Adult female

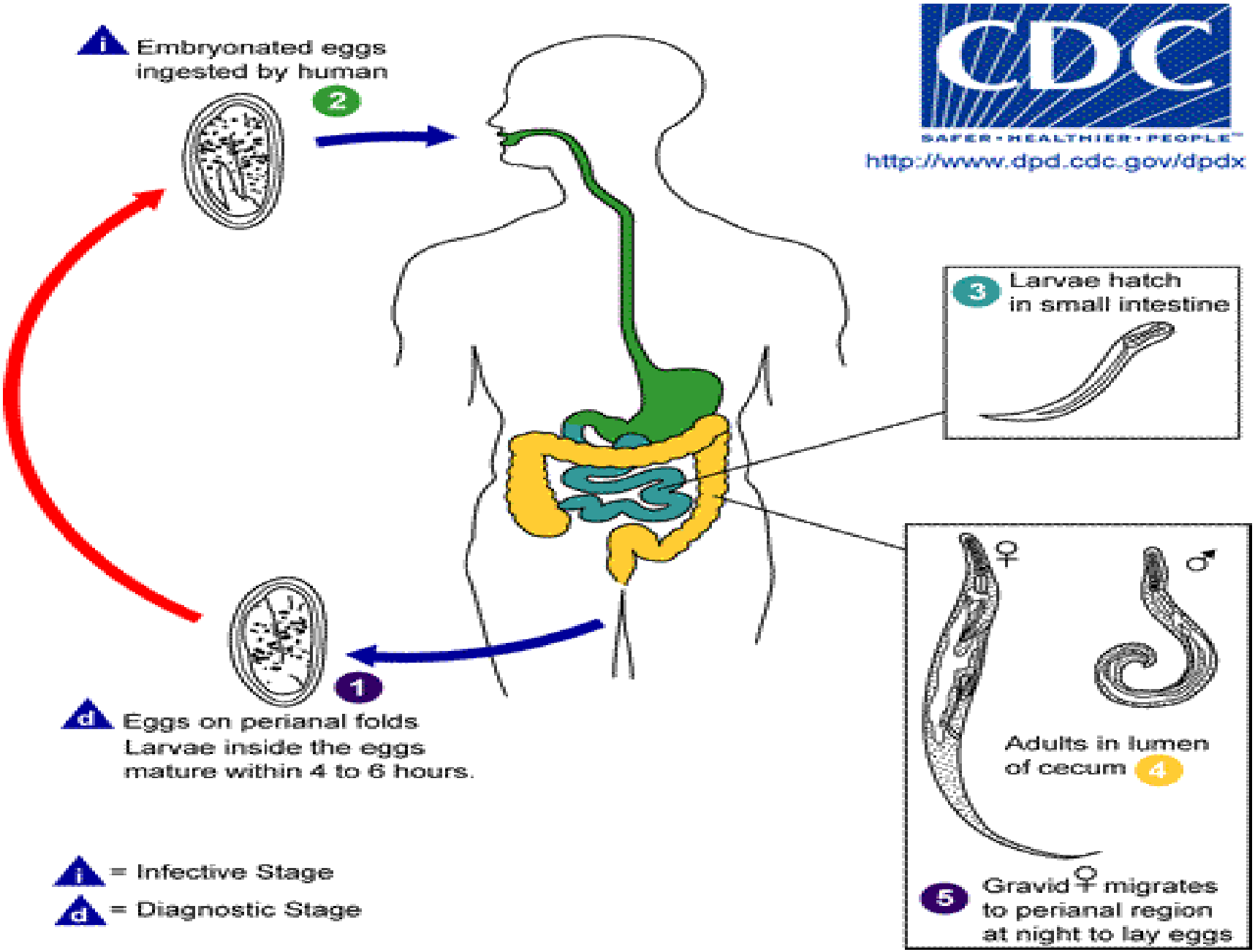
Adult female

Adult male

B- Egg:

- **Size :** 50x20 M
- **Shape :**D-shaped egg with double layer shell.
- **Content :** larva (mature)
- **Color :** translucent

Life cycle:


i Embryonated eggs ingested by human
2
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http://www.dpd.cdc.gov/dpdx
3 Larvae hatch in small intestine
♀
♂
Adults in lumen of cecum 4
5 Gravid ♀ migrates to perianal region at night to lay eggs
1
d Eggs on perianal folds
Larvae inside the eggs mature within 4 to 6 hours.
i = Infective Stage
d = Diagnostic Stage

Trichuris trichiura (whip worm)

- **Phylum:** Nemathelminthes
- **Class:** Nematoda
- **Disease:** Trichuriasis
- **G.D:** Cosmopolitan
- **D.H:** Man only
- **Habitat:** Large intestine (Caecum)
- **Infective stage:** mature egg
- **Diagnostic stage:** Egg
- **Mode of infection:** through ingestion mature egg in contaminated food or water.

Morphology:

A- Adult:

✓ Body cosist of a thin anterior fifth and a thick posterior two fifth.

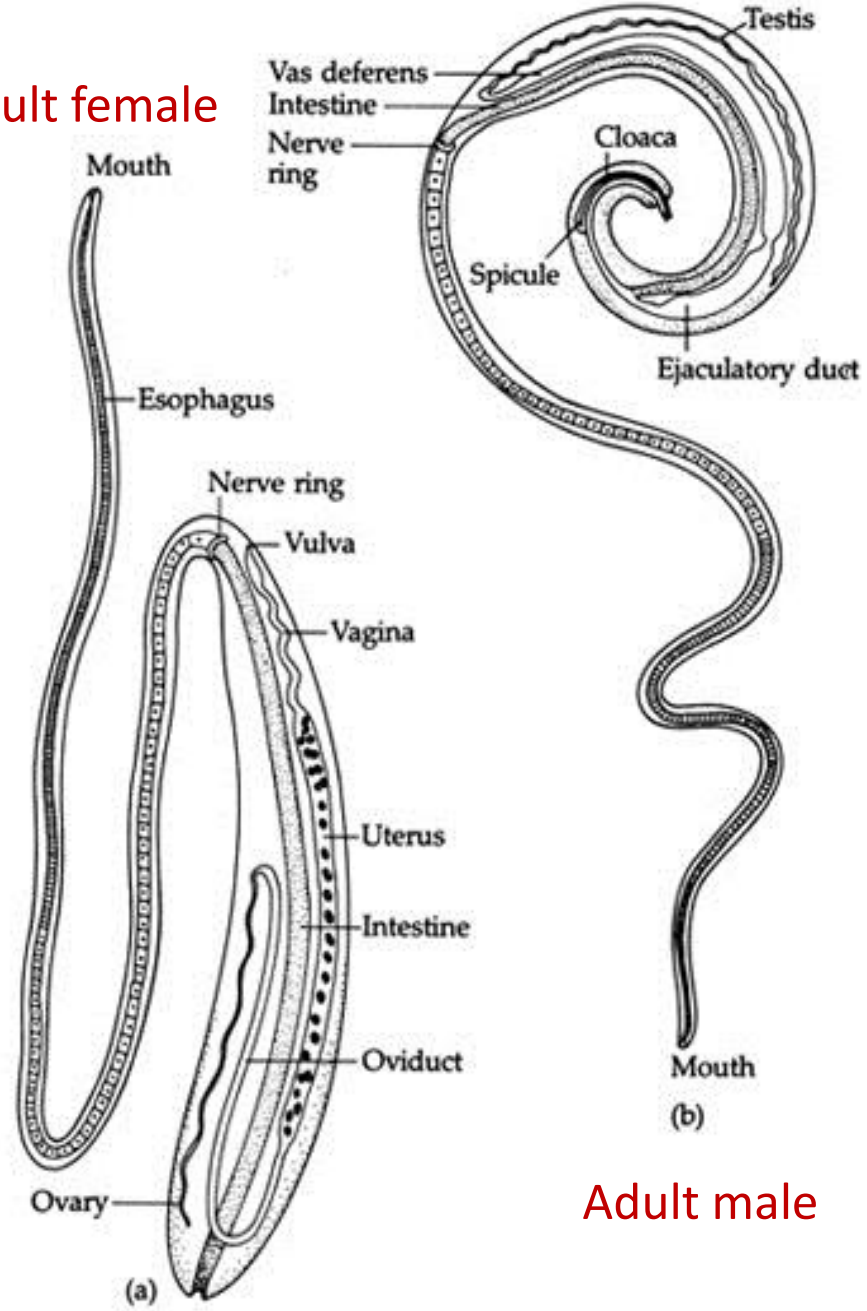
✓ with cellular oesophagus.

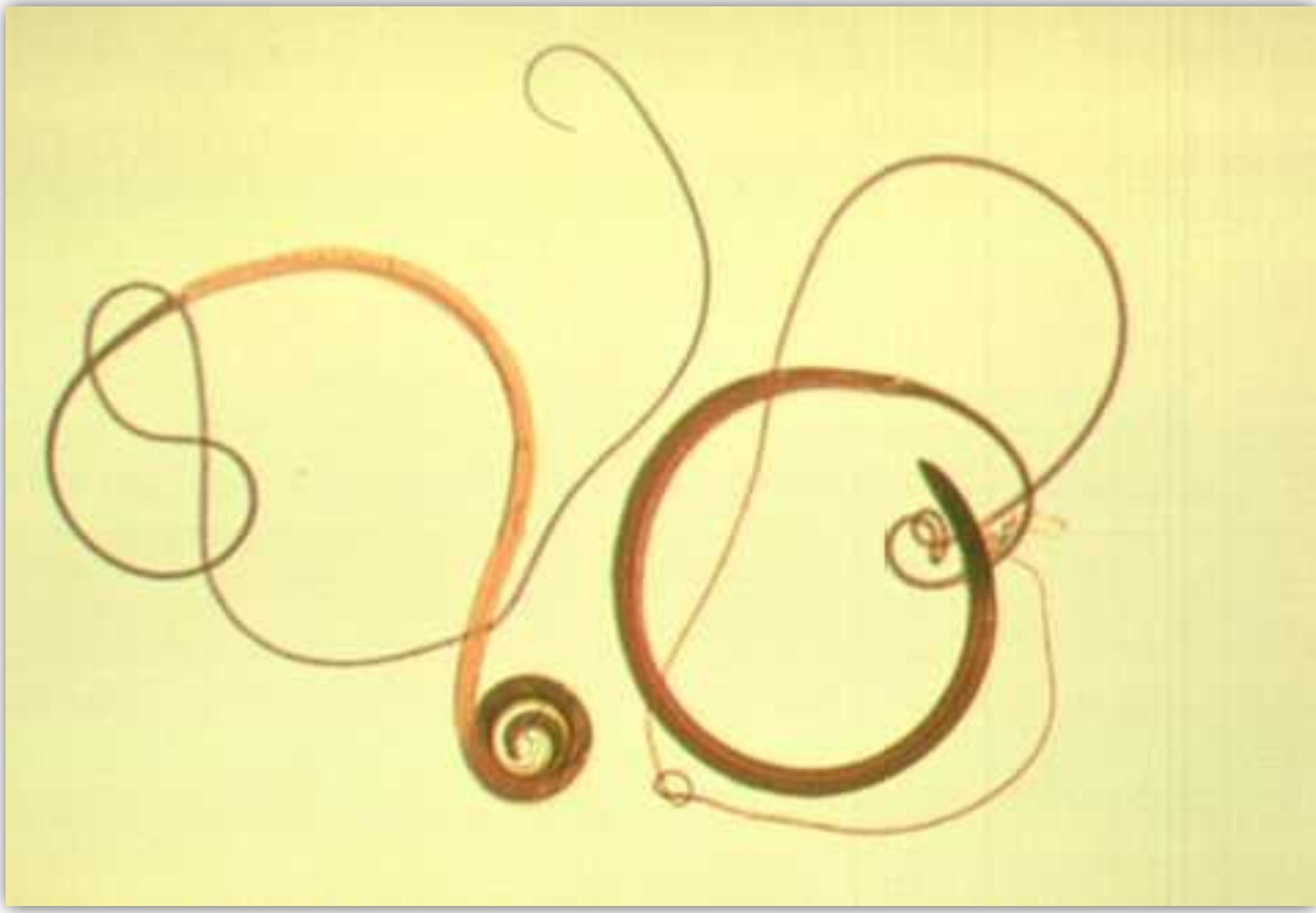
➢ Male:

- About 3 cm in length
- Posterior end is curved.

➢ Female:

- About 4 cm in length
- Posterior end is straight and blunt.



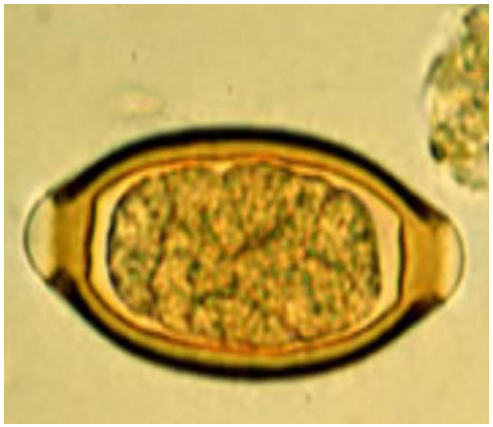


Adult male

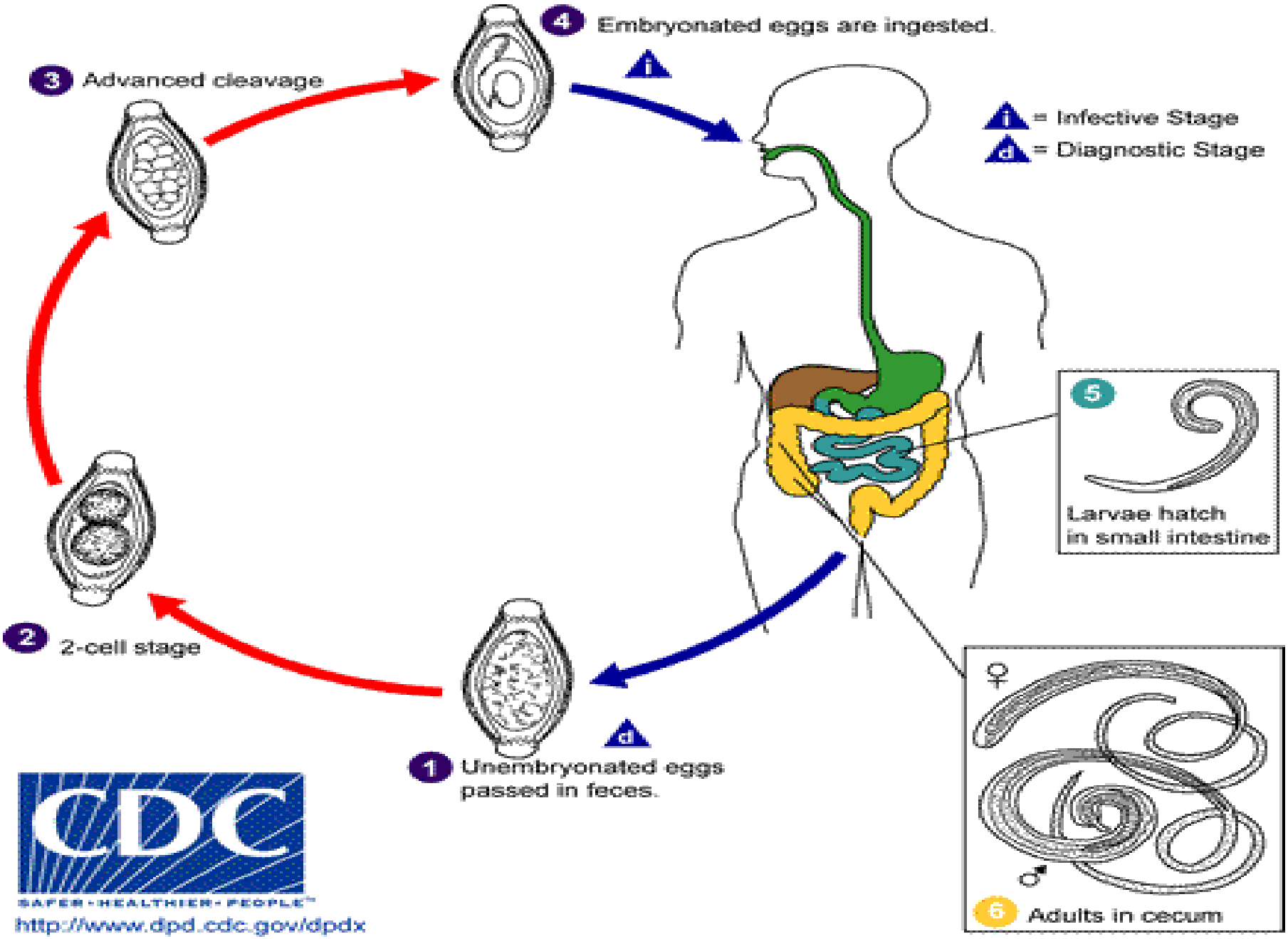
Adult female

B- Egg:

- **Size :** 50x25 M
- **Shape :**Barrel-shaped, thick shelled with 2 mucoid polar plugs.
- **Content :** immature ovum.
- **Color :** brownish .



Life cycle:



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Ancylostoma duodenale (Hook worm)

- ✓ **Phylum:** Nemathelminthes
- ✓ **Class:** Nematoda
- ✓ **Disease:** Ancylostomiasis
- ✓ **G.D:** Tropical &subtropical countries
- ✓ **D.H:** Man only
- ✓ **Habitat:** Small intestine
- ✓ **Infective stage:** Filariform larva
- ✓ **Diagnostic stage:** Egg
- ✓ **Mode of infection:** by penetration filariform larva human skin when he walks barefooted on soil containing the larva.

Morphology:

A- Adult:

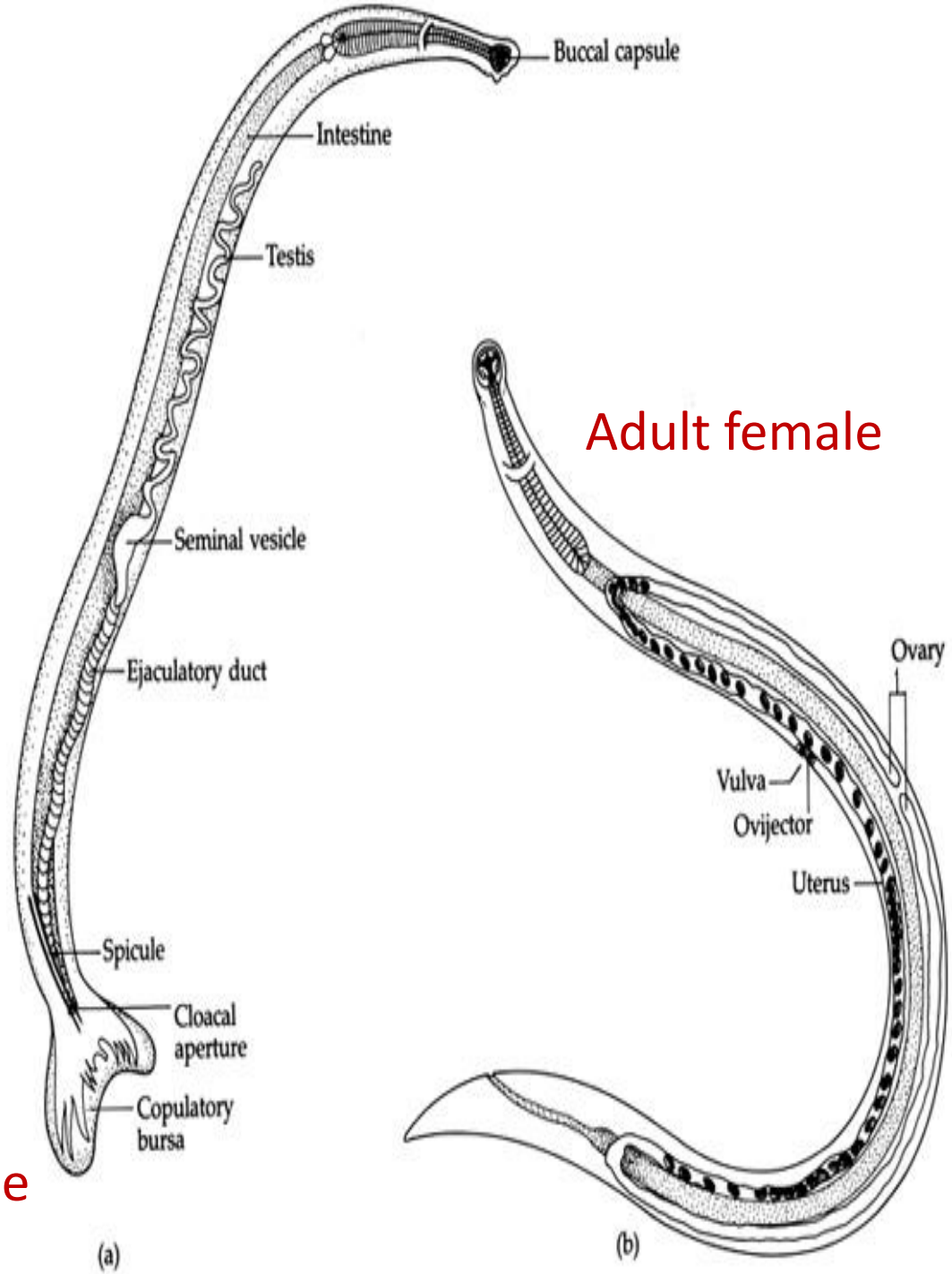
- Small , cylindrical ,grayish ,white or pink in color.
- Has buccal capsule with 2 pairs of teeth on anterior border , 2 lancet in its bottom ,and 2 plate on dorsal border
- Club – shaped oesophagus.
- The anterior end of the worm is slightly bent dorsally.

❑ Male:

- About 1cm in length
- Has copulatory bursa with two spicules

❑ Female:

- About 1.2 cm in length
- Pointed end

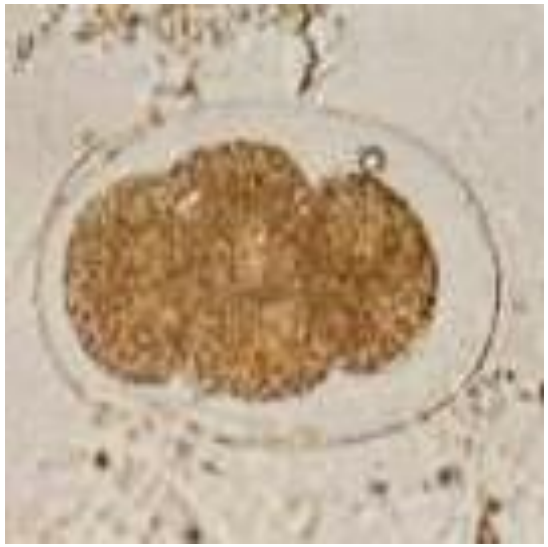


buccal capsule of Ancylostoma duodenalae

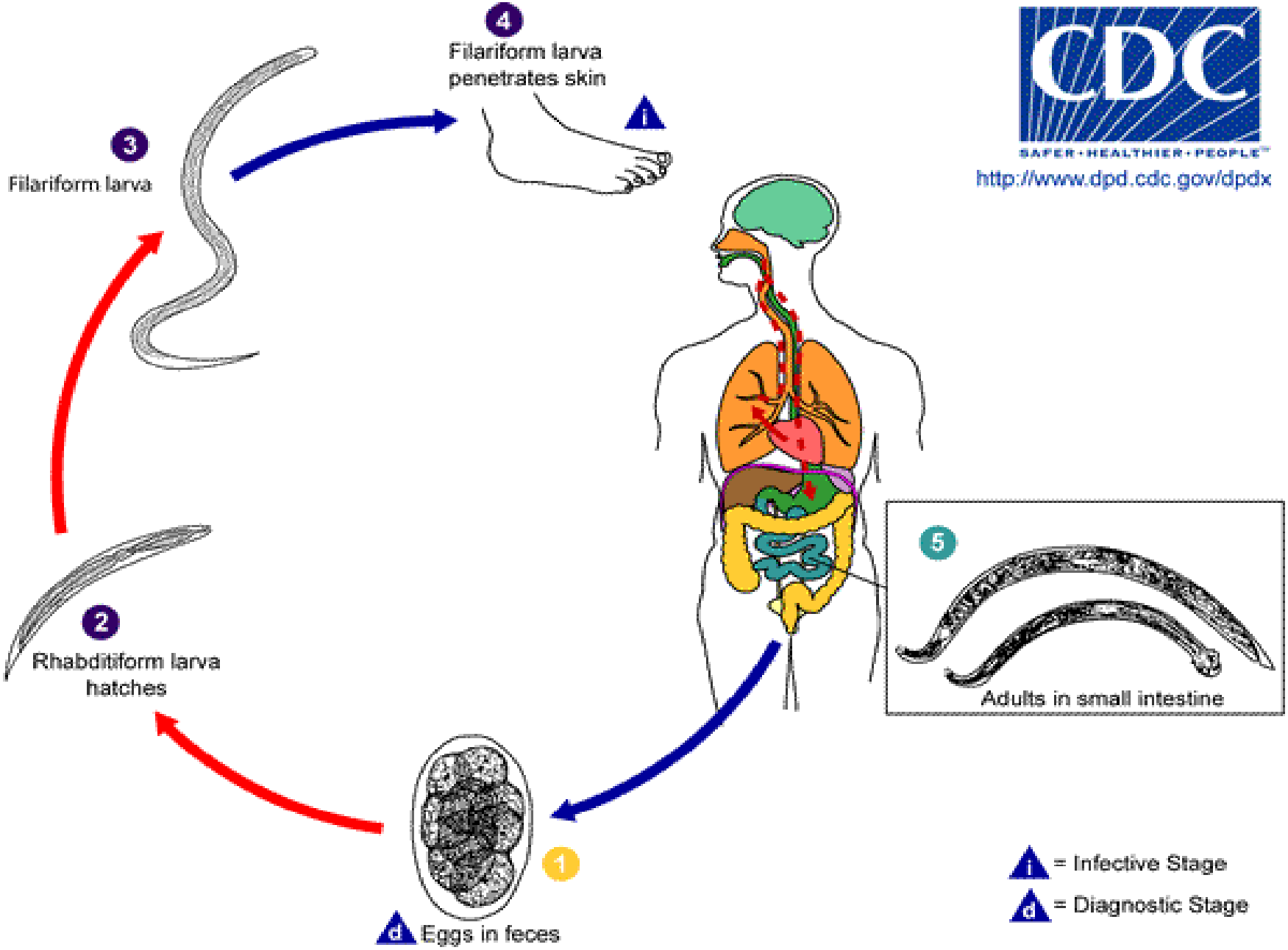
Copulatory bursa of adult male of *Ancylostoma duodenalae* f

B-Egg:

- **Size:**60x40 M
- **Shape:** Oval and thin shell
- **Content:** Immature ovum with 4-cell stage



Life cycle:



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